COMMENT RESPONSE DOCUMENT (CRD) TO NOTICE OF PROPOSED AMENDMENT (NPA) 2007-01

for amending Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks

and

for amending Decision No 2003/02/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications, including airworthiness code and acceptable means of compliance, for large aeroplanes (« CS-25 »)

and

for amending Decision No 2003/19/RM of the Executive Director of the Agency of 28 November 2003 on acceptable means of compliance and guidance material to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks.

and

for amending Decision No 2003/12/RM of the Executive Director of the Agency of 5 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances (« AMC-20 »)

and

for intended Airworthiness Directives

"Electrical Wiring Interconnection System"

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2007-01, dated 10 March 2007 was to envisage amending Regulation No 2042/2003[1], ED Decision No 2003/02/RM[2], ED Decision No 2003/19/RM[3] and ED Decision No 2003/12/RM[4] as well as to envisage the use of Part 21A.3B(c) requiring type certificate holders to produce instructions for continuing airworthiness derived from applying an Enhanced Zonal Analysis Procedure.

II. Consultation

2. The draft Opinion and Executive Director Decisions were published on the web site (http://www.easa.europa.eu) on 10 March 2007.

   By the closing date of 13 June 2007, the European Aviation Safety Agency ("the Agency") had received 116 comments from 18 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.

4. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:

   - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
   - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
   - **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
   - **Not Accepted** - The comment or proposed amendment is not shared by the Agency

   The resulting text highlights the changes as compared to the NPA.

---

[1] Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks, *OJ L 315, 28.11.2003, p. 1*. Regulation as last amended by Regulation (EC) 376/2007 *(OJ L 94, 4.4.2007, p. 18).*

[2] Decision No 2003/02/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications, including airworthiness code and acceptable means of compliance, for large aeroplanes (« CS-25 »). Decision as last amended by ED Decision 2007/020/R of 22 December 2007.

[3] Decision No 2003/19/RM of the Executive Director of the Agency of 28 November 2003 on acceptable means of compliance and guidance material to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks. Decision as last amended by ED Decision 2007/018/R of 18 December 2007.

[4] Decision No. 2003/12/RM of the Executive Director of the Agency of 5 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances (« AMC-20 »). Decision as last amended by ED Decision 2007/019/R of 19 December 2007.

5. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

6. Such reactions should be received by the Agency not later than 6 May 2008 and should be submitted using the Comment-Response Tool at http://hub.easa.europa.eu/crt.

IV. CRD table of comments, responses and resulting text

(General Comments)	-

comment	*17* comment by: *Bombardier* Attachment #1 On behalf of Bombardier Aerospace, Inc., please find attached our comments regarding the NPA 01-2007, "Electrical Wiring Interconnection Systems".
response	*Noted* The Agency agrees that harmonisation of the paragraph numbering is beneficial, and it is coordinating further with the FAA proposing to adopt the numbering as proposed in the EASA NPA. The Agency believes that the numbering should be in line with the EASA NPA because the "collector paragraph" is in a more logical place and the rules are presented in a more logical flow.

comment	*38* comment by: *AEA* The proposed FAA and EASA EWIS and EZAP requirements should be fully harmonized and identical. The contents of the associated advisory material should also be identical. Harmonized regulations will be required for implementation of the new regulation by the aviation industry
response	*Partially accepted* This NPA is harmonized with the FAA to the greatest extent possible. Nevertheless, mainly due to the differences between the European and the US regulatory systems, the text of the EASA rule will not be identical to the US final rule.

comment	*39* comment by: *Airbus* Airbus supports the approach to harmonize European and US airworthiness requirements and to clarify the requirements for the Electrical Wiring Interconnection System. Airbus requests that EASA and FAA closely cooperate in the review of the comments received on their respective proposals, so as to harmonize their final rules and advisory materials. Airbus is concerned about the significant changes introduced in the rule compared to content of the final reports of the ATSRAC working groups (especially Task 6 report, ref. WS.50.04) more than four years ago.
response	*Partially accepted* This NPA is harmonized with the FAA to the greatest extent possible. Nevertheless, mainly due to the differences between the European and the US regulatory systems, the text of the EASA rule will not be identical to the US final rule. The reports of the ATSRAC groups were recommendations to the regulatory authorities in order to assist them in their rulemaking task. The authorities are finally responsible for the final rule and therefore changes compared to the working group recommendations are possible.

comment	*82* comment by: *AEA* No proposed time schedule for implementation was provided by EASA. Due to the lack of an implementation schedule it is for airlines not possible to determine introduction feasibility. We suggest EASA consider an implementation period which is feasible for the industry and communicate the implementation schedule before the final rulemaking will be introduced.
response	*Not accepted* The proposed time schedule was provided in chapter B V. as part of the Intended Airworthiness Directives: 16 December 2008 for holders or applicants for a type certificate, 16 December 2009 for operators. Compliance dates will be adapted based on final acceptance of this CRD. The compliance times will be consistent with the FAA FAR-26. Type Certificate holders will have until 10 December 2009 to comply and produce new ICA; operators will have an additional 12 months for incorporation in their maintenance programme in accordance with Part-M.

comment	*91* comment by: *AEA* We would highlight that not all the STC data are still available due to STC Holder company disappearing along the years and therefore a special consideration should be taken on EWIS ICA issued by TC holders to take into account any possible additional wire added by STC embodied after airplane delivery. Those consideration should be in such a way to guarantee that special wire inspections and repairs have to be done also on wires that have not been installed as per TC Holder instructions We would also like to point the fact that the Standard Wiring Practice Manuals have to be revised to include the new CS25 requirements in such a way to give operators tools and information to perform wire repair and installation in agreement with the new requirements.
response	*Not accepted* 1st and 2nd paragraph: The holders or applicants for a type certificate cannot be required to provide guidelines for wiring installed under all possible STCs, for which they have no responsibilities. 3rd paragraph: Noted. The holders or applicants for a type certificate are requested to provide Standard Wiring Practice Manuals in accordance with AMC 20-23.

comment	*81* comment by: *AEA* Schedule for EWIS ICA should be such that opening and inspections minimize the aircraft grounding time during the check. An example of minimum grounding time impact could be by phasing the wire inspections to the already existing inspections for other critical airplane systems (surface control cables, actuators, fuel tank etc).
response	*Noted* EWIS ICA are aimed at having limited ground time impact. Nevertheless,

ground time and phasing for wire inspections depend on the ICA provided by the holder or applicant for a type certificate and the way the operator includes these ICA into his overall maintenance programme.

A. EXPLANATORY NOTE p. 4

comment *85* comment by: *AEA*

Page 71 AMC 20-21 par 2b.

Page 74 AMC 20-21 par 6.

Page 76, 77 AMC 20-21 par 9a.

Page 89, step 8a, 8b.

AEA would recommend adding an Acceptable Means of Compliance for the visual inspection methods. Presently the industry is developing automated test equipment for testing wiring. At the moment the equipment will be certified and available this proposed rulemaking will exclude the use of automated test equipment.

response *Not accepted*

The current text does not exclude the possibility of automatic test tools. It is the responsibility of the TC or STC holder to determine the appropriate test methods.
Once being available and proven, benefit from automated wiring test equipment might be taken on a case by case basis.

A. Explanatory Note - IV. Content of the draft opinion and decision - Summary p. 5-6

comment *6* comment by: *UK CAA*

Attachment #2

A Explanatory Note, IV content of the draft opinion and decision, 8 summary, 3rd paragraph, last line on page 6. "it is harmonised with the FAA".

PROPOSED TEXT/ COMMENT: Whilst the EASCG undertook every effort to harmonise with the FAA in its current form, NPA 2007-01 and the corresponding FAA NPRM contain differences particularly with respect to the new CS-25 subpart H paragraph numbering. EASA has previously submitted comments to the FAA concerning the differences between the NPA and the NPRM and this was contained in a document (EASCG/5/37) (see attached). The FAA understood and were sympathetic to the suggested changes to make the NPA and NPRM fully harmonised but this has yet to happen. It is suggested that the comments originally submitted are sent to the FAA once again.

JUSTIFICATION: With the current differences existing between the NPRM and the EASA NPA it is incorrect to say that the NPA is harmonised with the FAA. Therefore to prevent manufacturers having to document compliance with multiple subpart H paragraphs (for example) it is suggested that document

	EASCG/5/37 be resubmitted to the FAA urging a harmonisation to occur between the NPRM and NPA before both documents are formally published and rule changes occur.
response	*Noted* This NPA is harmonized with the FAA to the greatest extent possible. Nevertheless, mainly due to the differences between the European and the US regulatory systems, the text of the EASA rule will not be identical to the US final rule.

A. Explanatory Note - IV. Content of the draft opinion and decision - Detailed justification of amendments - Amendments to CS-25 - New Subpart H - 25.1703 Function and Installation; EWIS p. 10-11

comment	*24* comment by: *AIRBUS TRANSPORT INTERNATIONAL snc* Part A - Chapter V "Regulatory impact assessment" *(page 11)* Assessment on CS 25.1301 implies that this CS chapter requires each item of equipment to "function properly when installed". This requirement does not exist in current CS 25.1301 and therefore this text should be removed. Justification: False reference
response	*Accepted* This is an error in the explanatory text to the changes introduced by this NPA. In CS-25 the same intent is addressed in CS 25.1309(a).

A. Explanatory Note - IV. Content of the draft opinion and decision - Detailed justification of amendments - Amendments to CS-25 - Amendment to Commission Regulation (EC) No. 2042/2003 Part M p. 14-15

comment	*5* comment by: *Baines Simmons Limited* Baines Simmons generally supports the proposed amendments, however we believe that added visibility of the inspection requirements is necessary for Part 145 approved maintenance organisations to ensure that current certifying staff and B1/B2 support staff attain the required EWIS inspection competence. It is clear that the proposed changes to Part 66 address EWIS **knowledge** requirements, however this does not address inspector **competence** or existing licensed engineers. Suggested additional paragraph to **AMC 145.A.30 (h) 1**. Aircraft type rated certifying staff and B1/B2 support staff should have an understanding of the applicable aircraft Maintenance Programme task and inspection standards including those associated with Electrical Wiring Interconnect Systems.
response	*Not accepted* The Agency believe, however that 145.A30(h) and its associated AMC together with AMC 145.A.30(e) paragraph 2 should already address the maintenance of staff competence standards.

comment	*21* comment by: *Luftfahrt-Bundesamt (LBA)* Concerning the amendment of Part-66 Appendix I (Basic knowledge requirements, paragraph 7.7 of module 7) LBA in general supports the aim of this NPA. Nevertheless, from our point of view the change of Part-66 should not be implemented within the current NPA process. Justification: Such a change, though it seems to be a minor one, will raise several problems for maintenance organizations, license holders and the competent authorities which will lead to an increase of time and cost. Some questions are: - What about licenses issued before? - Is there a transition period? - What about granted Grandfather Rights or JAA-licenses according to article 5 of Commission Regulation (EC) 2042/2003? Aircraft maintenance training rules in most cases were derived from more or less painful accidents like the mentioned ones. The complete aircraft is constructed of parts all of them endangered by wrong handling and treatment disregarding protecting rules. Nevertheless many items of Appendix I to Part-66 are to be trained in Level 1 or 2. For each of them a critical malfunction caused by someone may be found in the past. Two aircraft lost 9 and 11 years ago, although hurtful by itself, may therefore not justify such a change. It might be that the knowledge of the mentioned problem has been grown in the past, but there is no hint to be found in the Explanatory Note of the NPA. To summarize it there is no evidence that the change of this particular part of Appendix 1 of Part-66 will improve the safety level at all. It will raise cost for all parties with unclear benefit. LBA therefore suggests to skip chapter II, sub-part (b) of this NPA. Instead of that a particular NPA process should be raised based on information about the lack of basic training in current maintenance systems.
response	*Partially accepted* Specifically the findings of the IIWG demonstrated the need to emphasise EWIS in the maintenance programme and the importance of EWIS training for maintenance personnel. This is covered adequately by NPA 2007-01. Maintenance activities on EWIS are considered equally critical to safety as for example tasks dealing with flight controls, for which also level 3 training is required. Existing licenses will not be affected by the change in the Appendix. However Part 145 approved maintenance organisations will have to ensure compliance with the new Part 66 requirements for their certifying staff in accordance with Part 145.A.35(d) and (e). An appropriate transition period of 18 months will be established in the final opinion by delaying the applicability of the amendment to Part 66. Initiating an additional NPA process would be of questionable benefit and time consuming.

A. Explanatory Note - IV. Content of the draft opinion and decision - Detailed justification of amendments - Amendments to CS-25 - Amendments to Acceptable Means of Compliance to Part M p. 15

comment *3* comment by: *Baines Simmons Limited*

The Explanatory Note of "Amendments to Acceptable Means of Compliance to Part M" does not agree with the proposed changes.
The heading of the first paragraph is incorrect, in that it refers to the wrong AMC.
This heading should read:
AMC M.A.302 Maintenance Programme
The heading and text of the second paragraph is incorrect in that it refers to the wrong sub-paragraph of M.A.706.
The heading should read:
AMC M.A.706(f) Personnel requirements
The text should read:
"The new AMC M.A.706(f)....."

response *Accepted*

This is an error in the explanatory text to the changes introduced by this NPA as well as in the numbering of the proposed AMC itself..
The heading of AMC M.A.302 should read "Maintenance programme"
The numbering of AMC M.A.706(f) should be M.A.706(i) both in the explanatory text as in the proposed change.

resulting text

AMC M.A.706(~~f~~i)

A. Explanatory Note - V. Regulatory Impact Assessment p. 15

comment *28* comment by: *Aircraft Electronics Association - Europe*

The Regulatory Impact Assessment is incorrect and must be prepared using European data.

Justification:
The Regulatory Impact Assessment is based on the maintenance, repair and alteration of aircraft operated and maintained in the United States with oversight provided by the US Federal Aviation Administration.
European Civil Aviation oversight is provided at a higher level with more oversight of aircraft maintenance, repairs and alterations. The assumptions of this Regulatory Impact Assessment are not valid for European maintained and operated aircraft.
The approval process for major repairs and major changes to aircraft electrical systems have a different level of Authority oversight between Europe Union Authorities and the approval processes of the US FAA.
The Regulatory Impact Assessment must be based on an analysis of similarity between the US findings or they must be based on an analysis of European aircraft and operations.
The financial burden to European small businesses is excessively high and produces an environment that challenges international competition and deters the growth of general aviation.

response | *Not accepted*

As stated in 4.1 of the RIA the EASCG contacted European Industry in order to gain specific European cost data. Unfortunately this data was not forthcoming leaving the Agency with no other option than to publish the data gained within USA.

The proposed requirements are only applicable to large aeroplanes and operators thereof and not to general aviation.

A. Explanatory Note - V. Regulatory Impact Assessment - Purpose and Intended Effect p. 15-17

comment | *33* comment by: *Aircraft Electronics Association - Europe*

a. Issue, which the NPA is intended to address and scale of the issue
The requirements of this proposal do not take into account the previous resolutions of the issues relating to the identified accidents.
EASA had implemented previous rulemaking to address the fuel system and electrical system failures identified in the TWA 800 accident as well as the in-flight entertainment system installation discrepancies identified as a result of the Swissair Flight 111 accident.
The continued citing of these accidents without accounting for interim solutions previous mandated by EASA is not acceptable. This is at least the third proposed regulation intended to resolve the same series of discrepancies.
The financial burden to European small businesses is excessively high and produces an environment that challenges international competition and deters the growth of general aviation.

response | *Noted*

Whilst regulations will be implemented at different times they are part of a consolidated approach to the overall safety improvements considered necessary.

The different regulations are complementary and not accumulative in their impact on industry.

The proposed requirements are only applicable to large aeroplanes and operators thereof and not to general aviation.

A. Explanatory Note - V. Regulatory Impact Assessment - Impacts - Safety and Economic Impact p. 18-21

comment | *7* comment by: *DGAC France*

The burden for wire identification seems underestimated, when using a "30 sec" for each label. AMC 25.1711, §8.a.(2) suggest an interval of 38 cm identification. It implies that either there are more labels to be added than expected, or the cable shall be replaced by a fully new identified one during maintenance, and therefore cost is underestimated here.

The cost table and description on pages 19-21 does not take into account all requirements added by this NPA, in particular the cost of 25.1709 for the TC holder.

response

Noted

The cost-benefit analysis by the FAA was provided as an indication of the costs and benefits that can be expected in Europe. The accuracy of the figures could not be assessed in detail by the Agency due to a lack of information from the European industry.

In any case the Agency does not use the RIA as a decision tool but only to aid in the decision making process whether a particular rule is appropriate.

comment

84 comment by: *AEA*

Annual Burden Estimat e) Page 19 of 148

According to the calculation of the economic impact an estimate of 3500 labels per tail number shall be applied. Although this paragraph mentioned the application of labels no further requirements were mentioned in CS-25. Also no further background information and foundation was provided for introducing new labels. The airlines position concerning labeling is that the current method of labeling wiring is sufficient for the additional inspections prescribed by the new rulemaking. We would suggest / requests to clarify the conflict in requirements between paragraph 4.1 and CS-25 concerning labeling wiring and the reason for introduction of new labels.

response

Not accepted

The labelling requirement is in the proposed CS 25.1711 and explained further in AMC 25.1711.

comment

83 comment by: *AEA*

We believe that the financial impact calculation is clear about the consequence for the industry. However, the only data available in the NPA is copied from the FAA NPRM and it does not match the proposed legislation in the NPA. The industry requires a better financial impact estimate for the NPA. We would like to suggest that EASA should contact (S)TC holders to obtain the number and contents of the changes to the MPD as result of the NPA. This will provide information for a better detailed financial impact calculation. Also a calculation for the additional required training for maintenance personal has not been addressed in this NPA.

response

Not accepted

As stated in 4.1 of the RIA the EASCG contacted European Industry (including AEA) in order to gain specific European cost data. Unfortunately this data was not forthcoming leaving the Agency with no other option than to publish the data gained within USA.

The proposed requirements are only applicable to large aeroplanes and operators thereof and not to general aviation.

A. Explanatory Note - V. Regulatory Impact Assessment - Impacts - Safety and Economic Impact for the various options p. 21-22

comment

22 comment by: *Deutsche Lufthansa AG*

Part A, Chp. V, para 4.2; para 5

	Part B, Chp. IV, AMC 20-21 Appendix C Part B, Chp. V General comments to maintenance programme related action items: Based on NPA 2007-01 Part A, Chp. V, para 4.2 proposed options (1 thru 5) the EASA has been concluded as per para 5, that option 4 is the preferred approach (refer to pages 21 thru 24 of NPA). Option 4 is limited to retro-active EZAP applicable to TC holders only - with STC issues definitely excluded by explained reasons. Consequently this limited approach has been incorporated into Part B, Chp. V for the intended AD (refer to page 148). By contrast, with reference to included Part B, Chp. IV, AMC 20-21 Appendix C is stated that: - the operator should collaborate with TC/STC holders to obtain information required to conduct EZAP analysis; - in situations where installed STC is no longer supported by viabel STC holder….the responsibility is assigned to individual operators… In cases the operator does not have experience in application of analysis it will be necessary for the operator to gain competence…etc. Taking into account preferred Option 4 versus requirements as per AMC 20-21 the operator's responsibility is not clearly defined in regard to STC issues. Please advice a summarized statement as guidance for operators in this specific issue under consideration of all Parts / Chapters of this NPA. Moreover, the status of EZAP Maintenance Tasks is unclear. We suppose, the policy might be similar to L/HIRF tasks (may be escalated but must not deleted from operator's maintenance programme). Please advice the intended status / related restrictions for EZAP tasks. Justification: - Clarification of operator’s responsibility in particular for STC-relevant EZAP issues under consideration of all Parts / Chapters of this NPA. - Clarification of intended status / related restrictions for EZAP tasks.
response	*Noted* Option 4 means that the new rules are applicable to all new applications but that the "retroactive" requirement is only applicable to existing TCs. The intended AD only addresses existing TCs, whereas the AMC is also and primarily applicable to new applications for both TC and STC. Therefore there is no inconsistency in the proposals. The applicable requirements for TC and STC applicants are defined under Part 21 and not by the AMC. The operator's responsibility is to implement in its maintenance programmes the updated instructions for continued airworthiness as issued by the TC and/or STC holder in accordance with the relevant provisions of Part M or applicable airworthiness directive as appropriate. The status of EZAP items is explained in AMC 20-21 chapter 11 step 9. They should be uniquely identified and cannot be deleted during maintenance programme development.

B. Draft Rules - I. Amendments to CS-25 p. 26

comment

20 comment by: *Boeing*

The section numbers used in this proposed CS-25 NPA and parallel FAA NPRM do not match. For example, FAA NPRM Section 25.1705 is NPA CS section 25.1709.The sections of the two regulations should match up, similar to the existing regulations (for example, Section 25.1301 is the same for both the U.S. Federal Aviation Regulations and the EASA Certification Specifications. The two final rules should be harmonized. (The final FAA rule has not been released yet, however.)
Justification:
If the sections remain different, it will be difficult for applicants to determine if the correct sections are called out without looking at the actual regulation and comparing them.

response

Noted

The Agency agrees that harmonisation of the paragraph numbering is beneficial, and it is coordinating further with the FAA proposing to adopt the numbering as proposed in the EASA NPA. The Agency believes that the numbering should be in line with the EASA NPA because the "collector paragraph" is in a more logical place and the rules are presented in a more logical flow.

Please note that CS 25.1301 is different from FAR 25.1301 (there is no CS 25.1301(d)) as FAA has not yet adopted the harmonised version of 25.1309 proposed by the SD&A harmonisation working group.

B. Draft Rules - I. Amendments to CS-25 - Amendments to existing CS-25 requirements, Book 1 - Subparts D & F - CS 25.1353 p. 28

comment

106 comment by: *Boeing*

Remove the reference to Section 25.1357.

Justification:
Section 25.1357 deals with circuit breakers, and circuit breakers are not defined as a component of EWIS.

response

Accepted

Reference to CS 25.1357 is already included in CS 25.1717 and therefore redundant in this subparagraph 25.1353(b).
Although not commented the Agency found that the whole subparagraph (b) is redundant because the referenced paragraphs are requirements in their own right and moved to Subpart H.

resulting text

CS 25.1353 (b) Electrical Wiring Interconnection System components must meet the requirements of ~~25.1357,~~ 25.1703, 25.1707, 25.1711 and 25.1717.

B. Draft Rules - I. Amendments to CS-25 - Amendments to existing CS-25 requirements, Book 1 - Appendix H - H 25.1 p. 28-29

comment

49 comment by: *Airbus*

Airbus proposes not to implement this change.
Justification: See comment for §25.1729

response

Not accepted

Following the logic of requiring specific attention to EWIS certification a specific paragraph on ICA is needed in Subpart H and consequently the reference in Appendix H is updated.

B. Draft Rules - I. Amendments to CS-25 - Amendments to existing CS-25 requirements, Book 1 - Appendix H - H 25.4 p. 29

comment

50 comment by: *Airbus*

Airbus proposes to delete §(a)(3), as there is no requirement defining EWIS mandatory replacement times in proposed 25.1701.
The AMC to Appendix H25.5, p. 66, also makes reference to H25.4(a)(3). If §(a)(3) is removed, the AMC also needs to be corrected (at least delete reference to H25.4(a)(3)).
The AMC to Appendix H25.5 should be corrected as follows: Reference to approval should be deleted as the general wording in the frame of §25.1529 ICA is acceptance.

response

Partially accepted

The term "as defined in CS 25.1701" refers to the definition of the EWIS components and not to the mandatory replacement time. Guidance on how to define mandatory replacement times for EWIS components is included in AMC Appendix H25.5.

CS 25.1703 requires that EWIS components be installed according to limitations specified for that component, which could be a service life limit.

"Approval by the Agency" is deleted because approval of documents is regulated by Part-21 and cannot be in a non-binding certification specification.

resulting text

AMC Appendix H25.5
Instructions for Continued Airworthiness applicable to EWIS.

In accordance with subparagraph H 25.~~4(a)(3)~~5 the applicant must prepare Instructions for Continued Airworthiness (ICA) applicable to EWIS as defined by 25.1701 that ~~are approved by the Agency and~~ should include the following:

B. Draft Rules - I. Amendments to CS-25 - Amendments to existing CS-25 requirements, Book 1 - Appendix H - new H 25.5 p. 29

comment

14 comment by: *Transport Canada Civil Aviation Standards Branch*

Document Text

H25.5 Electrical Wiring Interconnection System Instructions for Continued Airworthiness
The applicant must prepare Instructions for Continued Airworthiness applicable to Electrical Wiring Interconnection System as defined in CS 25.1701. (see AMC Appendix H25.5)
Proposed Text/ Comment
It is suggested that the CS-25 Appendix H25.5 and AMC Appendix H25.5 paragraphs be coordinated, as appropriate.
Justification
When comparing the provisions of H25.5 and AMC Appendix H25.5, the AMC appears to add a requirement, over and above the CS-22 paragraph, that the EWIS ICAs be approved. Therfore, the appearance is that these two paragraphs are not coordinated.

response *Accepted*

As a result of comment nr. 50 the words "are approved by the Agency" are deleted from the AMC.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1701 Definition p. 30

comment *8* comment by: *DGAC France*

As worded by 25.1701, Electronic Flight Bags would be excluded from those requirements. There might be a need to check this matter with working group 20.002 on EFB.

response *Noted*

CS 25.1701(c) excludes avionics equipment that are qualified to acceptable environmental conditions and testing procedures.

comment *41* comment by: *Airbus*

§25.1701(b): Page 30

Airbus proposes to add the following to the list: "…and external wiring of equipment."

Justification:
For completeness and consistency, the external wiring of equipment should also be considered, as it can become part of the A/C installation (e. g. galley connection wiring, seat connection wiring…).

response *Accepted*

This is considered as a clarification. The proposed text is added at the end of § 25.1701(b).

comment *93* comment by: *Boeing*

Fiber optic cables that comply with §25.869(a)(4) of FAA rules and other unique installation requirements should be included, the same as wiring.

Justification:

Boeing is using more fiber optics in current design activities. If fiber optics cables are excluded from this rule, a new rule should be required to address fiber optic cables

response *Not accepted*

Fibre optics don't carry electrical energy as e.g. wiring does, fibre optics are not of a concern in this NPA.

comment *92* comment by: *Boeing*

Subparagraph (a) should be revised to include terminal blocks, circuit protective devices, and contactors as items included in the definition of EWIS.
Justification:
EWIS is not limited only to the listed items in subparagraph (a). EWIS components might also include terminal blocks, circuit protective devices, and contactors. This should be specified in the text of the rule

response *Not accepted*

The list of components from § 25.1701(a) is not meant to be an all inclusive list (see also AMC 25.1701 §3). Determination for other individual items can be done on a specific application. The functions of circuit protective devices are covered separately in the CS 25.

comment *40* comment by: *Airbus*

Airbus proposes to replace the word "energy" by "energy or information".
Justification:
Although transmission of information is based on transmission of energy, the paragraph might misleadingly be interpreted as being applicable only for high power, or power supply transmission.

response *Partially accepted*

The gist of the comment is accepted. For the sake of clarity, the following modification is done to the definition: …. For the purpose of transmitting electrical energy, *including data and signals*….

resulting text

25.1701(a)
…. for the purpose of transmitting electrical energy, including data and signals….

25.1701(b)
..... circuit board back-planes, ~~and~~ wire integration units and external wiring of equipment.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1703 Functionand Installation; EWIS p. 31

comment *43* comment by: *Airbus*

Airbus proposes to replace the words "hazardous effects" by "hazard".

Justification:
Eliminate ambiguous interpretation due to the use of an inappropriate System Safety classification word (§1309(b)).
The effect on the component itself needs to be covered instead of the effect on the function.

response

Not accepted

The word "hazard" can also be considered as ambiguous. There is no implied reference to numerical assessment of 25.1309(b). AMC 25.1703 gives some details on acceptable means for compliance.

It is the possible safety hazard from failure of the component that the rule is addressing, and not strictly the effect on the component, or its function.

comment

94 comment by: *Boeing*

The text of subparagraph (c) should be revised to read:

(c) The design and installation of the main power cables, including generator cables,
in the fuselage *must allow for a reasonable degree of deformation and stretching without failure.*

Justification:
This change will ensure that the language aligns with the existing regulation contained in §25.869(a)(3).

response

Accepted

This inconsistency with original CS 25.869(a)(3) is corrected in the final text of 25.1703(c).

comment

44 comment by: *Airbus*

Airbus proposes to change the sentence as follows: "The design and installation of the main power cables in the fuselage, including generator cables, must allow for a reasonable degree of deformation and stretching without failure."

Justification:
The intention of old §25.869(a)(3) was lost during transfer to new subpart H. The wording of the AMC material to this paragraph nevertheless explains the original intent. There is therefore an inconsistency between the requirement and the related AMC material. Airbus has no adverse experience with insufficient degree of deformation in the A/C.

response

Accepted

This inconsistency with original CS 25.869(a)(3) is corrected in the final text of 25.1703(c).

resulting text

25.1703(c) The design and installation of the main power cables (including generator cables) in the fuselage must allow for a reasonable degree of deformation and stretching without failure.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1705 Systems and Functions; EWIS p. 31-32

comment	*95* comment by: *Boeing* As used in both subparagraphs, the term "applicable requirements" should be revised to harmonize with the parallel FAA NPRM use of the term. We note that the parallel FAA NPRM did not include sections 25.854; 25.858; 25.1203; 25.1303(b) and 25.131(a)(2); whereas, this NPA does. Justification: Harmonization between the two sets of regulations should be made to the greatest extent possible. Without harmonization, the applicant will be faced with conflicting requirements, unjustifiably high costs of compliance, and potentially complex system designs in an attempt to satisfy two different sets of regulations.
response	*Noted* See also response to comment no. 6. CS 25.1705 is a collector requirement for EWIS not covered by a specific other requirement from Subpart H. No corrections are made to the list. Although the text is not exactly harmonised with the FAA text as to their locations within Subpart H, the technical intent is the same.

comment	*96* comment by: *Boeing* Delete reference to all the specific sections. Justification: Compliance with this rule should not be limited to specific systems. CS 25.1705 (b) [as well as subparagraph (a)] are applicable to all systems.
response	*Not accepted* The purpose of this paragraph is precisely to point out that those CS 25 systems requirements where EWIS have to be considered as an integral part for system compliance.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1707 System Separation; EWIS p. 32-33

comment	*45* comment by: *Airbus* Airbus proposes to replace the wording "independent aeroplane power sources" by "independent aeroplane power sources or power sources connected in combination". Justification: The intent of the original rule (§25.1351 (b)(1)(2)) shall be kept. See comments on the AMC 25.1707.
response	*Accepted* To align with original rule intent for EWIS part, CS 25.1707(d) the text is

modified.

comment

46 comment by: *Airbus*

§25.1707(e), (f), (g), (h), (i), (j): Pages 32, 33
Airbus proposes to replace the wording "will not create a hazardous condition" by "will not create a hazard".
Justification:
Eliminate ambiguous interpretation due to the use of an inappropriate System Safety classification word (§1309(b)).

response

Not accepted

The word "hazard" can also be considered as ambiguous. There is no implied reference to numerical assessment of 25.1309(b) as stated in AMC 25.1707.

It is recognised that current AMC 25.1707 §5 is ambiguous. As also stated in comment 10 disposal the text of the AMC is therefore improved. It is stated there that the term "hazardous condition" in CS 25.1707 is used in a different context than it is when associated with the EWIS safety analysis requirements of CS 25.1709. What is meant by that statement is that CS 25.1707 does not require a numerical safety assessment for compliance. The meaning of the term "hazardous" remains the same, whether used in CS 25.1707, in CS 25.1709, or in current CS 25.1309 or CS 25.1353.

comment

99 comment by: *Boeing*

Reword this subparagraph to read as follows:

(l) Each EWIS must be designed and installed so there is adequate physical separation between it and <u>other</u> aircraft <u>components</u> ~~structure, and so that the EWIS is protected from sharp edges and corners~~, in order to minimize potential for abrasion/chafing, vibration damage, and other types of mechanical damage.

Justification:
This change is necessary for clarification. Wiring damage can occur from abrasion and/or chafing to equipment or other aircraft components, so it should not be limited only to sharp edges.

response

Partially accepted

Comment related to interference with aeroplane components (not only structure) is accepted. Mention of sharp edges and corners is considered as a specific request worth to be kept.

Final text to read:

"(l) Each EWIS must be designed and installed so there is adequate physical separation between it and other aeroplane components and structure, and so that the EWIS is protected from sharp edges and corners, in order to minimize potential for abrasion/chafing, vibration damage, and other types of mechanical damage."

comment	*98* comment by: *Boeing* We request clarification as to whether an "independent airplane power source" is considered to be an airplane level power source as is related to an APU battery, etc., or whether it is <u>any</u> power source that transmits. Justification: If it is the latter, we recommend that there be some differentiation in the associated guidance material for the differences between ground blocks and ground studs, and for the differences between static grounds that terminate at ground blocks and ground studs. We do not consider ground blocks "a common terminating location" for non-redundant grounds.
response	*Noted* Aeroplane independent electrical power sources in the context of this § refer to aeroplane level sources such as generators or main batteries. No change is made to proposed text.

comment	*97* comment by: *Boeing* Eliminate the reference to Section 25.1309(b)(1) and (b)(2) from the proposed rule. Justification: The applicable guidance material does not require a numerical probability analysis.
response	*Partially accepted* Comment is actually more relevant to FAA text. EASA text only makes reference to 25.1309. The intent of the reference to failure conditions as defined by 25.1309 was to require that an EWIS, under normal and failure conditions, would not create an unsafe condition. The failure conditions that were intended to be referenced are "hazardous" or "catastrophic," used in CS 25.1309 and 25.1709. In reviewing the text of the proposal, it has been realised that this reference could cause confusion as to the intent of the requirement and that the reference to the "catastrophic" failure condition is not necessary for the purposes of this requirement. To better align the requirement of sub-paragraph (a) with the requirements of sub-paragraphs (e) through (j), and to ensure adequate separation between EWIS and other aeroplane systems not specifically addressed by those sub-paragraphs and sub-paragraph (k), the first sentence of § 25.1707(a) has been revised. It now reads: "Each EWIS must be designed and installed with adequate physical separation from other EWIS and aeroplane systems so that an EWIS component failure will not create a hazardous condition."

resulting text	25.1707(a) Each EWIS must be designed and installed with adequate physical separation from other EWIS and aeroplane systems so that an EWIS component failure will not create a hazardous condition ~~so that under normal or failure condition as defined by CS 25.1309, it will not adversely affect the simultaneous operation of any other systems necessary for continued safe flight, landing and egress~~.<u></u> Unless otherwise stated .....

25.1707(d)
Each EWIS associated with independent aeroplane power sources or power sources connected in combination must be designed and installed to ensure adequate physical separation and electrical isolation so that a fault in any one aeroplane power source EWIS will not adversely affect any other independent power sources.
In addition:
.....

25.1707(l)
Each EWIS must be designed and installed ~~such that~~ so there is adequate physical separation between it and other aeroplane components and structure, and so that the EWIS is protected from sharp edges and corners, in order to minimise potential for abrasion/chafing, vibration damage, and other types of mechanical damage.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1709 System Safety; EWIS p. 33

comment *9* comment by: *DGAC France*

The explanatory note proposes that the applicants would have to perform a system safety assessment of EWIS. However it is difficult to assess the amount of work required. An EWIS system as mentioned in 25.1701 (a) could be any single wire. There could be numerous interaction of a wire with the other wires in its environment. This may lead to an amount of cases not really usable, and maybe unachievable for bundles of wires.

The benefit on safety of such detailed assessment is not clearly justified in the NPA. Examples mentioned are showing issues due to maintenance activities.

DGAC France understands that appropriate action has to be taken on maintenance in order to prevent such occurrences. But the requirement of SSA on TC Holder does not seem to bring much added value compared to existing zonal analysis and correction of found issues.

response *Noted*

1. This aspect has been extensively discussed with all relevant stakeholders and accepted. The AMC 25.1709 provides further justification and guidance for such an assessment to be undertaken and the Agency finds that with this guidance the requirement can be complied with.

comment *62* comment by: *Airbus*

Airbus proposes to change the text as follows:
"Each EWIS must be designed and installed so that it does not lead to a catastrophic failure condition as a consequence of a single EWIS failure.
EWIS failure should be understood as failure affecting from one to all EWIS components within a single bundle."
Justification:
Based on the figures provided in the equivalent FAA NPRM cost-benefit analysis, the total set of new rules is expected to prevent 32,8 incidents or accidents (including 1,2 fatal accident) in the next 25 years. Based on only the current Airbus fleet, over 25 years the total flight hours would be around 3 10+8.Also, pessimistically, it is assumed that the complete flying aircraft fleet, concerned by the set of rules, is 3 times the Airbus fleet.

This gives around 10+9 flying hours over the 25 years to come for the total of concerned aircraft. Combination of the 32,8 events with the total flying hours gives a probability between 10-7 and 10-9.

At such probability it is usually accepted that the event be Hazardous. Thus the focus is to avoid them to be Catastrophic. In addition the 1,2 event combined with 10+9 flight hours over 25 years is compatible with the Extremely Improbable quantitative objective.

Based on the above, Airbus considers that quantitative objective is naturally met, thus remains only the qualitative objective to support the Extremely Improbable compliance. Focus on common cause elimination seems the most efficient way to prevent EWIS implication in Catastrophic events.
As a conclusion, for compatibility between expectation and new rule, the following text is proposed:"Each EWIS must be designed and installed so that it does not lead to a catastrophic failure condition as a consequence of a single EWIS failure.EWIS failure should be understood as failure affecting from one to all EWIS components within a single bundle."
The aim of such new requirement, if necessary, is to make more explicit 25.1309 application in the specific context of EWIS. Refer to our comment on AMC25.1709 § "Inadequacies of §25.1309 in relation to EWIS safety assessments".

response *Noted*

This aspect has been extensively discussed with all relevant stakeholders and accepted.
The AMC 25.1709 provides further justification and guidance for such an assessment to be undertaken. The purpose of CS 25.1709 is to ensure that the same analytical rigor applied to other systems for compliance with CS 25.1309 is applied to EWIS. That is why the proposal specified the same criteria as CS 25.1309.

The analytical methods used for an economic evaluation are very different from methods required for risk assessment by CS 25.1309 (or CS 25.1709). The regulatory impact assessment is a projected incident rate based on historical data. Estimating possible failures for compliance requires a detailed evaluation of the modes and effects of potential failures in a specific system design.

comment *100* comment by: *Boeing*

We request that this section be deleted from the proposed rule; all references to this section throughout the NPA should be deleted as well.

Justification:
The requirements of this proposed section would be better served if they were made part of Section 25.1309(b). This suggestion was part of the consolidated Industry comment submission to the FAA's parallel NPRM, with which we concur. Please refer to the AIA-GAMA letter dated October 24, 2003, Subject: "Industry recommendation on Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) Aging Wiring Rulemaking."

response *Not accepted*

1. This aspect has been extensively discussed with all relevant stakeholders and accepted. Experience showed that, although current 25.1309 assessment should already address EWIS, this did not prevent incidents and accidents caused by wire failures occurring. The AMC 25.1709 provides further

justification and guidance for such an assessment to be undertaken and it explains that this specific assessment can be done in conjunction with the 25.1309 assessment.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1711 Component identification; EWIS p. 33-34

comment *101* comment by: *Boeing*

Reword subparagraph (a) as follows:

(a) EWIS components must be labeled or otherwise identified using a consistent method that facilitates identification of the ~~wire~~ EWIS component, its function, and its design limitations, if any.

Justification:
The suggested change would clarify the requirement.

response *Accepted*

25.1711(a) is corrected as proposed in the comment.

comment *102* comment by: *Boeing*

Reword subparagraph (b)(2) as follows:

(2) If an EWIS component cannot be marked physically with all aspects contained in (b) above, then other means of identification must be provided.

Justification:
The suggested change would clarify the requirement.

response *Not accepted*

The proposed modification does not clarify the requirement.

resulting text

25.1711
(a) EWIS components must be labelled or otherwise identified using a consistent method that facilitates identification of the ~~wire~~ EWIS component, its function, and its design limitations, if any.
.....

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1713 Fire Protection; EWIS p. 34

comment *107* comment by: *Boeing*

Paragraph 2 requires that: *" . . . EWIS components in regions immediately behind firewalls and in engine pod attachment structures should be made of such materials and installed at such a distance from the firewall that they will not suffer damage that could hazard the aeroplane if the surface of the firewall adjacent to the fire is heated to 1100° C for*

	15 minutes..” We request that this section be revised by changing “15 minutes” to “5 minutes.” Justification: The 15-minute requirement is for fire proof parts. This contradicts the requirements of the current Sections 25.869(a)(2) and 25.1713(a)(2), which require only that the items be fire resistant. Making the requested change will better align the guidance material with the existing regulations.
response	*Not accepted* Presumably the comment is applicable to AMC 25.1713(b) (not part of basic text). The relevant sentence in this AMC paragraph is based on CS 25.1182 (Nacelle areas behind firewalls, and engine pod attaching structures containing flammable fluids) and considered correct (reference to designated fire zones). It is not based on CS 25.869.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1721 Protection of EWIS p. 34-35

comment	*103* comment by: *Boeing* Reword subparagraph (a)(1) as follows: (1) It cannot be damaged by *normal* movement of cargo or baggage in the compartment” Justification: This change will clarify the requirements.
response	*Not accepted* Requirement is strictly copied from 25.855(e)(1) text which is not limited to normal movement.

comment	*104* comment by: *Boeing* Proposed Section 25.1721(b) requires that EWIS be designed to minimize the risk of damage caused by movement of personnel in the area. The FAA-sponsored Advisory Council (ATSRAC) that recommended the requirements contained in the FAA’s parallel NPRM noted that damaged wiring is related to the frequency of maintenance access, and recommended that maintenance personnel be trained in the proper handling of EWIS. We consider that, although it is likely to prevent some inadvertent damage, this regulation only partially addresses the issue if it does not also address proper training of personnel. We suggest that it be addressed in the final regulation. Justification: Appropriate training of maintenance personnel is essential to ensure that the intent of this proposed rule section is carried out.
response	*Noted*

It is agreed that appropriate training of maintenance personnel is necessary. Generic requirements within Parts 21, 145 and M require staffs to be adequately trained. This is currently covered by the proposed AMC 20-22 (Aeroplane Electrical Wiring Interconnection System Training Programme) and specifically its preamble.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1727 Flammable Fluid Shutoff Means; EWIS p. 35

comment

105 comment by: *Boeing*

Reword this section to read as follows:

EWIS associated with each flammable fluid shutoff means and control must be ~~fireproof~~
fire resistant or must be located . . .

Justification:
Boeing recommends that the word "fireproof" be replaced with "fire resistant"' to be consistent with the terminology used in Sections 25.869(a)(2) and 25.1735.

response

Not accepted

To keep the intent of CS 25.1189, the EWIS associated to such means must be fireproof.

B. Draft Rules - I. Amendments to CS-25 - New CS-25 Subpart H Electrical Wiring Interconnection System, Book 1 - 25.1729 Instructions for Continued Airworthiness; EWIS p. 35

comment

47 comment by: *Airbus*

Airbus proposes to delete this paragraph. In line with this proposal, the change of CS-25 Book 1 Appendix H, § H25.1 (addition of "and 25.1729", p. 28) shouldn't be implemented.

Justification:
All instructions for continued airworthiness should be linked to §25.1529 to have a consistent approach and permit a single compliance statement.

In case that the proposal is not accepted, ambiguity should be avoided and reference to approval should be deleted as the general wording in the frame of §25.1529 ICA is acceptance.

response

Not accepted

Following the logic of requiring specific attention to EWIS certification a specific paragraph on ICA is needed in Subpart H and consequently the reference in Appendix H is updated.
CS 25.1729 does not make reference to approval.

comment

48 comment by: *Airbus*

Airbus proposes to delete this paragraph. In line with this proposal, the change of CS-25 Book 1 Appendix H, § H25.1 (addition of "and 25.1729", p. 28) shouldn't be implemented.

Justification:
All instructions for continued airworthiness should be linked to §25.1529 to have a consistent approach and permit a single compliance statement.

In case that the proposal is not accepted, ambiguity should be avoided and reference to approval should be deleted as the general wording in the frame of §25.1529 ICA is acceptance.

response

Not accepted

Following the logic of requiring specific attention to EWIS certification a specific paragraph on ICA is needed in Subpart H and consequently the reference in Appendix H is updated.
CS 25.1729 does not make reference to approval.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25 Subpart H p. 37-39

comment

25 comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

The table shows that new 25.1703(a)(3) is linked with previous 25.1301(d). CS 25.1301(d) does not exist, therefore the correlation is false and should be removed.
Justification:
False reference.

response

Partially accepted

The table is making reference to an older version of 25.1301(d) that is now no longer part of CS 25.1301. Intent of 25.1301(d) has been moved to new CS 25.1309(a).

Correct reference for 25.1703(a)(3) has to be changed from 25.1301(d) to 25.1309(a) (specific to CS compared to FAR 25).

resulting text

AMC 25 Subpart H

CS 25.1703 Function and installation; EWIS	(a)(3)	~~CS 25.1301(d)~~ CS 25.1309(a)

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1701 Definition p. 39-40

comment

51 comment by: *Airbus*

Airbus proposes to replace in §(2) the word "energy" by "energy or information".

Justification:
Although transmission of information is based on transmission of energy, the paragraph might misleadingly be interpreted as being applicable only for high power, or power supply transmission.

response

Partially accepted

Comment is correct. For the sake of clarity, the following modification is done to the definition as done for comment 40 and to align with revised 25.1701 (a) text: …. For the purpose of transmitting electrical energy, *including data and signals*….

comment

52 comment by: *Airbus*

Airbus proposes to add in §(4) the wirings coming from equipments delivered with external cables, which will be installed on A/C bundles (like particular galleys, seat electronics…).
Furthermore latest Industry Standards should be reflected in (4), which states that distribution panels and power centers are not qualified to environmental standards. On recent aircraft programs, power centers tend to be supplied from equipment manufacturers and consequently be qualified against appropriate environmental standards. Thus, they should not belong to EWIS scope. Instead, they should preferably be certified as part of the electrical power system.

Justification:
For completeness and consistency the external wiring of equipment should also be considered, as it can become part of the A/C installation.

Furthermore, it should be reflected that it is state of the art that distribution panels and power centers are supplied from equipment manufacturers and that they are therefore not necessarily qualified by the A/C manufacturer alone.

response

Partially accepted

Text to be modified similar to comment 41 resolution and to align with revised 25.1701(b) regarding external wiring of equipment. Statement of power centres being possibly qualified against appropriate environmental standards is valid, but not considered to deserve a change in the definition of EWIS. The list can be adapted to a specific application.

comment

53 comment by: *Airbus*

Airbus proposes to add in §(6) the words "for example" after "such as".

Justification:
To clarify that the list of systems mentioned is not an exhaustive list.

response

Not accepted

"such as" has the same meaning as "for example".

resulting text

AMC 25.1701

.....

2 Subparagraph CS 25.1701(a) defines EWIS as 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. The term "wire" means bare or insulated wire used for the purpose of electrical energy transmission, grounding, or bonding. This includes electrical cables, coaxial cables, ribbon cables, power feeders, and databuses.

.....
4 CS 25.1701(b) says that EWIS components located inside shelves, panels, racks, junction boxes, distribution panels, and back-planes of equipment racks (e.g., circuit board back-planes, wire integration units, external wiring of equipment) are covered by the EWIS definition. .....

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1703 Function And Installation; EWIS p. 40-46

comment *54* comment by: *Airbus*

From the last sentence of §(6) and the last but one sentence of §(9.11.b.) we can understand that insulation cables susceptible to arc tracking are not formerly banished everywhere, whereas this was an objective given to ATSRAC Task n°6.

Airbus proposes to update the AMC for the paragraphs mentioned here below:

Paragraph (9.1): The following sentence could be added: "If the aircraft service life is extended through analysis/modifications, then such analysis should include EWIS components."

Paragraph (9.3.c.) is not at the right place (nothing to see with Mechanical strength). It should be moved in §(9.7) or AMC 25.1703(e).

Paragraph (9.3.d): The two last sentences of this paragraph are not at the right place (nothing to see with Mechanical strength). They should be moved in §(9.8).

The example given in §§(9.4) and (9.5) should be removed as bend radius can be defined differently according to insulation characteristics or installation practices.

Paragraph (9.7.c.) is redundant with 25.1707 (j).

Paragraph (9.7.d.): The following sentence should be added to cover other acceptable practices: "When not possible, the bending radius must be in accordance with the acceptable minimum bundle radius."

The note added in §(9.g.) relates more to §(9.h.).

response *Partially accepted*

First paragraph: Not accepted. Banishing certain wire types was not an objective of ATSRAC Task No 6.

Proposal for 9.1: Partially accepted: The proposed text is accepted with minor modification. "If the aircraft service life is extended, then EWIS components should be taken into account."

Proposal for 9.3.c: Not accepted. Although movement of the paragraph may be

appropriate, the Agency finds that the paragraph is related to mechanical strength. If there is not enough slack in the wire for re-terminations, undue strain could be placed on the wire.

Proposal for 9.3.d: Not accepted. Although movement of the paragraph may be appropriate, the Agency finds that the paragraph is related to mechanical strength.

Proposal for 9.4 and 9.5: Not accepted: these are examples only.

Proposal for 9.7.c: Noted. Although this paragraph is redundant with 25.1707(j) it is kept to give the reader an overview of all relevant aspects of wire bundle routing.

Proposal for 9.7.d: Accepted.

Proposal for note to 9.11.f: Noted. The Note is considered appropriate in relation to this subparagraph but the text is improved to make it more generic.

comment

109 comment by: *Boeing*

Paragraph 7 states: *"….As it is used in this requirement, a 'reasonable degree of deformation and stretching' should be about 10% of the length of the electrical cable"*

We request that "10%" be revised to "a maximum of 2%."

Justification:
We consider that 10% of the length of the cable is excessive deformation, and suggest that this degree be reduced to a maximum of 2% of the length.

response

Not accepted

CS 25.1703(c) is based on the requirement formerly located in CS 25.869(a)(3). That paragraph is identical to the FAR 25 requirement which was established by Amendment 25-15 in 1967. Although that amendment did not specifically define 10% as the reasonable degree of deformation, according to the FAA 10% is the amount that was intended when Amendment 15 was issued. The Agency accepts this as reasonable too.

resulting text

AMC 25.1703

9.1: …… then these intervals must be specified in the ICA as required by CS 25.1529. If the aircraft service life is extended, then EWIS components should be taken into account.

9.7.d. Wiring routed across hinged panels, should be routed and clamped so that the bundle will twist, rather than bend, when the panel is moved. When not possible, the bending radius must be in accordance with the acceptable minimum bundle radius.

-

9.11.f
……
Note: Additional guidance for selecting wires ~~rating~~ and other EWIS components can be found in SAE AS50881 and ~~AECMA~~ EN2853.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1703(e) EWIS component selection for future modifications p. 46

comment

55 comment by: *Airbus*

The need for a dedicated AMC for §25.1703(e) is not obvious. It should be contained in the overall AMC for §25.1703.

Anyway, this AMC suggests that airframers should give away their standardized installation/design directives to all TC modifiers or STC applicants throughout worldwide Industry. However such directives contain experience and knowledge that is part of the airframer's intellectual property. Consequently, this AMC should be re-worded so as not to jeopardize the best interests of European and US aircraft manufacturers. For example, it could be the responsibility of local airworthiness authorities to check that proposed TC modifications do not violate the design practices used by the TC holder.

response

Partially accepted

First comment related to no need for dedicated AMC is correct. Text of AMC 1703(e) is moved as a new paragraph 10 of AMC 25.1703.

Second comment is noted but no change is deemed necessary, as AMC does not state that airframers have to give away their installation/design directives throughout worldwide industry. Responsibility of the Agency remains to check that proposed modifications respect appropriate standards.

resulting text

AMC 25.1703

.....

10. EWIS component selection for future modifications.

If a TC includes subpart H in its certification basis, future modifiers of those TCs should comply with the subpart H requirements by using the same or equivalent standards / design practices as those used by the TC holder. If modifiers choose to deviate from those standards / design practices, they should have to substantiate compliance independently. The standards / design practices used by the TC holder in order to justify their own choice of components should also be considered.

~~**AMC 25.1703(e)**~~

~~**EWIS component selection for future modifications**~~.

~~If a TC includes subpart H in its certification basis, future modifiers of those TCs should comply with the subpart H requirements by using the same or equivalent standards / design practices as those used by the TC holder. If modifiers choose to deviate from those standards / design practices, they should have to substantiate compliance independently. The standards / design practices used by the TC holder in order to justify their own choice of components should also be considered.~~

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1707 System separation; EWIS p. 46-50

comment *10* comment by: *DGAC France*

AMC 25.1707, §5 (page 48) states that the term "hazardous condition" is used in a different context than in 25.1709 and from table1. This is confusing. If the term has a different meaning, it should be defined. DGAC France understand that the meaning is the same, but that compliance findings is made with different means such as a "qualitative design assessment" .

Therefore, the AMC 25.1707 (5) shall be clarified.

DGAC France believes that special attention may need to be paid on such "qualitative approach" by the Agency (concerning training/harmonization of certifying staff) in order to ensure common understanding and avoid unequal treatment between applicants.

response *Partially accepted*

It is recognised that current AMC 25.1707 §5 is ambiguous where it is stated that the term "hazardous condition" in CS 25.1707 is used in a different context than it is when associated with the EWIS safety analysis requirements of CS 25.1709. What is meant by that statement is that CS 25.1707 does not require a numerical safety assessment for compliance. The commenter understanding about meaning of "hazardous condition" is correct. The meaning of the term "hazardous" remains the same, whether used in CS 25.1707, in CS 25.1709, or in current CS 25.1309 or CS 25.1353.

The following new first paragraph in paragraph 5 is included :

Meaning of the term "hazardous condition" as used in CS 25.1707.

The term "hazardous condition" in CS 25.1707 has the same meaning that the one used in CS 25.1309 or CS 25.1709. Unlike CS 25.1309 or CS 25.1709, no probability objectives are required for compliance. The intent of CS 25.1707 is that the applicant must perform a qualitative design assessment of the installed EWIS and the physical separation to guard against hazardous conditions.

In answer to comment on standardisation, it can be stated that training of the affected authority staff is under consideration.

comment *56* comment by: *Airbus*

The entire text of §(5) gives evidence that the EASA recognizes the wording "hazardous condition" as highly ambiguous and misleading as it may probably be interpreted in relation with 25.1309 system safety classification. Instead of relying on clarifications in a separate Advisory Circular, it would be simpler to just eliminate ambiguities by simply using an unambiguous wording like "hazards" in the proposed 25.17xx regulations themselves.

If not done, risks exist that industry will be obliged to double all necessary brackets at each point, in order to cover a single bracket defect.

§(9): it is appropriate to recall that EWIS components for the generators must

comply with 25.1351(b)(1)(2) and must receive the same attention as generators themselves. However, §(9) fails to substantiate why the proposed 25.1707(d) requires that a fault in one generator EWIS must definitely not affect any other generator. This requirement is more severe than current 25.1351(b)(1)(2) and may for example prevent design like generators paralleling, even if all other safety requirements are met, without any clear reasons. EASA should develop rationales for the more severe generator isolation requirement or make it in-line with current 25.1351(b).

§§ (10) to (12): The text should call for common-points minimization, instead of full 100% separation, to allow for some flexibility to be discussed on a case-by-case basis with the airworthiness authority. Indeed, in some cases, it may not be technically feasible to implement the theoretically desired separation. The current text appears to call for extending Fuel-Tank-Safety-based fuel system wires installation practices to just each and every EWIS component in the airplane (see for example the last sentence of §(11)), which appears as not practical and unrealistic. Precautions proportional to the risks, to be assessed on a case-by-case basis, would be more appropriate.

response

Partially accepted

The first point regards ambiguity of the term "hazardous condition" and considered to be answered by the modification done according to comment 10.

The second point relates to possible increase of severity vs. current 25.1351(b)(1)(2) and considered to be answered by modification to basic CS 25.1707(d) according to comment 45. There is no implication to prevent design like generators paralleling.

The third point relates to flexibility. AMC material is giving guidance on acceptable separation criteria. If this cannot be met, alternatives can be proposed. No text change is proposed.

resulting text

AMC 25.1707

.....

5 Meaning of the term "hazardous condition" as used in CS 25.1707.

The term "hazardous condition" in CS 25.1707 ~~is used in a different context than in CS 25.1709. CS 25.1709 uses the terms "hazardous" and "catastrophic" for failure conditions as defined in Table 1: Classification of Failure Conditions, of this AMC, that could be associated with a numerical probability objective.~~ has the same meaning as the one used in CS 25.1309 or CS 25.1709. Unlike CS 25.1309 or CS 25.1709, no probability objectives are required for compliance. _The intent of CS 25.1707, is that the applicant must perform a qualitative design assessment of the installed EWIS and the physical separation to guard against hazardous conditions

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1709 System safety; EWIS p. 50-60

comment

11 comment by: *DGAC France*

AMC 25.1707 § 5 is referring to 25.1709 as requesting a "numerical probability assessment". However, AMC 25.1709 introduction § 4 specifies that the

compliance to CS25.1709 analysis is based on a qualitative approach as opposed to a numerical approach.

This inconsistency should be solved.

DGAC France believes that special attention may need to be paid on such "qualitative approach" by the Agency (concerning training/harmonization of certifying staff) in order to ensure common understanding and avoid unequal treatment between applicants.

response *Accepted*

The last sentence of chapter 5 is deleted as it is inconsistent with AMC 25.1709.

Training of the affected authority staff is under consideration.

comment *36* comment by: *ATR*

AMC 25.1709 – point 4 – Compliance summary (page 51)

"*The intent is not to examine each individual wire and its relation to other wires. Rather, it is to ensure that there are no hazardous combinations."*

In this sentence, please clarify if "hazardous" means HAZARDOUS failure condition which must be demonstrated as extremely remote. If not, change the word in order to avoid confusion.

response *Noted*

The interpretation by the comment provider is confirmed.

comment *37* comment by: *ATR*

AMC 25.1709 – point 12c – Box A : functional hazard assessment (page 58)

"If the aircraft level FHA is not available, then the applicant must generate an aircraft level FHA based on the proposed modification."

Does that mean, for example, that if a cable is added to a bundle, the aircraft level FHA must be generated for all the systems for which a cable is routed in same bundle?
Concerning ATR aircraft, the certification was supported with system level FHA. The FC at aircraft level cannot be identified without performing a complete aircraft level FHA, what is a huge job.
We suggest that for aircraft for which the certification was performed with only system level FHA, aircraft level FHA be not required.

response *Not accepted*

The applicable certification specifications for a changed product are defined in accordance with Part 21A.101. See Part 21A.101 and its AMC/GM for more details.
Only if compliance with the latest CS is required the AMC becomes applicable. In general an AMC is one way to comply with the requirements but not the only way. Other methods can be proposed for agreement by the Agency.

comment	*63* comment by: *Airbus* General comment: All the AMC (text, flow chart boxes texts, flow chart boxes comments) should be reviewed and updated to be compliant with new rule proposed text. (see our comment form on CS 25.1709).
response	*Not accepted* The comment on CS 25.1709 was not accepted.

comment	*65* comment by: *Airbus* Inadequacies of CS 25.1309 in relation to EWIS safety assessments (p. 51): This paragraph is copied from the proposed FAA AC 25.17xx, which refers to the current FAR 25.1309. Contrary to the current FAR 25.1309, the current CS 25.1309 is not limited to systems and equipment that are "required for Type Certification or by operating rules". In its comments on NPRM 05-08 and AC 25.17xx, Airbus proposed that FAA, instead of creating a new rule, harmonize FAR 25.1309 with CS 25.1309, which is adequate in relation to EWIS safety assessments. This solution is considered by Airbus as a better way to address safety concerns. Indeed different rules lead, for manufacturers, to additional compliance demonstration without any gain on safety. In particular, it has to be noted that the current CS 25.1309 prohibits the "traditional thinking" mentioned in this paragraph. Here is the extract of CS25.1309 (a): "The aeroplane equipment and systems must be designed and installed so that: (1) Those required for type certification or by operating rules, or whose improper functioning would reduce safety, perform as intended under the aeroplane operating and environmental conditions. (2) Other equipment and systems are not a source of danger in themselves and do not adversely affect the proper functioning of those covered by sub-paragraph (a)(1) of this paragraph." For those reasons, the AMC paragraph referring to CS 25.1309 should be rewritten to show that the current CS 25.1309 is adequate, and applicable to wiring systems.
response	*Partially accepted* It is agreed that the statement in the AMC "This is because the current CS 25.1309(a) only covers systems and equipment that are "required for Type Certification or by operating rules," is incorrect. This is removed. Comments on the FAA text are not responded by the Agency. The chapter 2 is intended to explain the inadequacy of the current 25.1309 approach justifying a more focused approach for EWIS.

comment	*110* comment by: *Boeing* Delete AMC 25.1709. Also delete any other reference to CS 1709 or AMC 1709.

Justification:

In light of our comments to the NPA, in which we requested deletion of proposed CS Section 25.1709, we also are requesting deletion of this associated AMC.

response *Not accepted*

1. This aspect has been extensively discussed with all relevant stakeholders and accepted. Experience showed that, although current 25.1309 assessment should already address EWIS, this did not prevent incidents and accidents caused by wire failures occurring. The AMC 25.1709 provides further justification and guidance for such an assessment to be undertaken and it explains that this specific assessment can be done in conjunction with the 25.1309 assessment.

comment *78* comment by: *Airbus*

Flow chart 2

Airbus is not directly concerned by this flow chart, thus Airbus do not comment its content otherwise that harmonization with the modification proposed by Airbus on flowchart1.

response *Noted*

comment *77* comment by: *Airbus*

Descriptive text for flowchart 1, Section (c.3) BOXES N & O (p. 56)

The last paragraph should be included to the last bullet. Indeed each developed mitigation strategy has to be validated against possible adverse effects. The text should thus be:

- "Confirm that this mitigation solution is compatible with existing installations and installation criteria. If the EWIS was the failure cause, the subsequent mitigation strategy developed may introduce new adverse effects not previously identified by the analysis. Check for any new adverse effects and update the aircraft level FHA and other system safety assessments as necessary."

response *Partially accepted*

The gist of the comment is accepted: the whole paragraph is reformatted to be without bullets.

comment *76* comment by: *Airbus*

Descriptive text for flowchart 1, Section (c.1) BOX J System safety assessments (p. 54 / p. 56)

For compliance with the propose rule, Airbus propose to replace box text and box comment as follow:

- Box text (in the flow chart1, p. 54):

Based on CAT failure conditions identified in Systems FHA/PSSA/SSA, Common Cause Analysis is performed including EWIS as a potential common cause (from BOX B).

- Box comment (p. 56):

In the box text, only the Systems FHA are used because by application of CS 25.1309 all systems FHA are built based on A/C FHA.

response *Not accepted*

Because the comment on CS 25.1709 was not accepted.

comment *75* comment by: *Airbus*

Descriptive text for flowchart 1, Section (b.3) BOX F & G Development and validation of mitigation strategy (p. 55)

To be homogenous with Airbus proposed rule, keep only the two criteria:

(i) Catastrophic failure conditions do not result from a single common cause event or failure

(ii) This mitigation solution does not introduce any new potential failure conditions.

response *Not accepted*

Because the comment on CS 25.1709 was not accepted.

comment *74* comment by: *Airbus*

Descriptive text for flowchart 1, Section (b.2.ii) V&V of installation criteria (p. 55):

The text contained in the final report of ATSRAC Task 6 is considered by Airbus as more appropriate. Indeed the wording of several sentences were changed without any identified advantage also the sentences "Regardless of probability, any single... should be substantiated" was added to focus on one of the failure cases without any rationale. Finally the references made to §25.1703(b) for cable selection do not add significant clarification compared to the sentence which indicates that the process will be used to ascertain that design & installation criteria were correctly applied.

response *Not accepted*

The reports of the ATSRAC groups were recommendations to the regulatory authorities in order to assist them in their rulemaking task. The authorities are finally responsible for the final rule and therefore changes compared to the working group recommendations are possible.

comment *73* comment by: *Airbus*

Descriptive text for flowchart 1, Section (b.2.i) V&V of installation criteria (p. 55): Airbus proposes to add reference to CS 25.1707 in addition to CS 25.1703, for separation aspects.

response	*Accepted*

comment	*72* comment by: *Airbus* Descriptive text for flowchart 1, Section (b.1) EWIS characteristics (p. 55): Airbus proposes to replace the first sentence by: "Use the results of BOX A & J to identify EWIS installation criteria..."
response	*Partially accepted* The proposed text is accepted with a slight improvement. The same change is introduced in chapter 12.d.(1)

comment	*71* comment by: *Airbus* Flowchart 1 (p. 54): Airbus proposes to remove the note for the "mitigation definition" at the bottom of the flowchart and replace it by reference to §9(c).
response	*Not accepted* The note is kept for user friendliness and is consistent with the definition in chapter 9.

comment	*70* comment by: *Airbus* Flowcharts depicting the analysis process (p. 53-54): Airbus proposes to remove the word "hazardous" for homogeneity with the Airbus proposed rule.
response	*Not accepted* Because the comment on CS 25.1709 was not accepted.

comment	*69* comment by: *Airbus* Classification of failure terms (p. 52): All the term are already defined in CS 25.1309. Having the same definition scattered in various rules may lead, over the time, to lack of homogeneity following one rule evolution not combined with evolution of the other one(s). Airbus proposes to keep only one reference. Thus it is proposed, here, to make reference to CS 25.1309.
response	*Accepted* The terms are already defined in AMC 25.1309

comment	*68* comment by: *Airbus* Qualitative probability terms (p. 51-52):

Airbus proposes to remove this paragraph for homogeneity with the Airbus proposed rule.

response *Not accepted*

Because the comment on CS 25.1709 was not accepted.

comment *67* comment by: *Airbus*

Compliance summary (p. 51):

To avoid misinterpretation Airbus propose to replace "hazardous combination" by "unsafe condition".

response *Partially accepted*

The proposed wording is not accepted but the Agency agrees to reword the sentence for clarity.

comment *66* comment by: *Airbus*

Integrated nature of EWIS (p. 51):

It is not correct to suggest that airframers perform inadequate CS 25.1309 safety assessment when a risk is of an "integrated nature".

Risks of an integrated nature are adequately covered by CS 25.1309 safety assessments like Particular Risk Analysis or Common Cause Analysis, without the need for new regulations on top of CS 25.1309.

From a purely regulatory standpoint, CS 25.1309(b) should be regarded as sufficient.

response *Not accepted*

Historical data shows that 25.1309 has not been sufficient to address EWIS.

comment *64* comment by: *Airbus*

In the introduction (p. 50):

The word "system" in the introduction "25.1709 requires applicants to perform a system safety assessment of the EWIS.") should be removed in order to distinguish the present study from the so called System Safety Assessment as performed through CS 25.1309.

response *Not accepted*

The title and wording of the AMC is consistent with the title of CS 25.1709.

comment *35* comment by: *ATR*

The EWIS process is introduced as a qualitative approach. For the demonstration of extremely remote (10-7) for EWIS failures leading to HAZARDOUS effects, we understand that it will be based on general approach and generic failure rate. Up to now, according to state of the art, the

	probability for an open wire, when considered in SSA , was 10-7. Does EASA confirm that an open wire can be considered as extremely remote phenomena? If yes, why is there a request for EWIS analysis for HAZARDOUS failure cases since the probability of wire cut, undue ground, failed connector… have a generic probability not higher than 10-7/FH?
response	*Noted* The Agency finds that it is not possible to assign generic failure rates as suggested by the comment provider. Evidence has shown that the traditional 25.1309 approach did not reliably address the effects of a physical wire failure as a cause of other wires within the EWIS. There are other failure modes to be considered in addition to the ones quoted. The effects of these failure modes could be more severe than hazardous.

resulting text

AMC 25.1707

5. Meaning of the term "hazardous condition" as used in CS 25.1707.

.....

~~Also note that a numerical probability assessment may still be required under the requirements of CS 25.1709 if the aeroplane level functional hazard assessment identifies EWIS failures that could affect safe operation of the aeroplane.~~

AMC 25.1709

2. Inadequacies of CS 25.1309 in relation to EWIS safety assessments.

.....

This is because ~~the current CS 25.1309(a) only covers systems and equipment that are "required for Type Certification or by operating rules," and~~ wiring for non-required systems is sometimes ignored.

.....

4. Compliance summary

.....

Rather, it is to ensure that there are no ~~hazardous~~ combinations of failures that could lead to a hazardous condition.

7. Classification of failure terms.

The classification of failure conditions is ~~given in Table 1, as~~ specified in AMC 25.1309.

~~**Table 1: Classification of Failure Conditions**~~

~~**Term**~~	~~**Explanation**~~
~~**No Safety Effect**~~	~~Failure conditions that would have no effect on safety, for example failure conditions that would not affect the operational capability of the aeroplane or increase flightcrew workload.~~

Minor	Failure conditions that would not significantly reduce aeroplane safety, and involve flightcrew actions that are well within their capabilities. For example, minor failure conditions may include: • a slight reduction in safety margins or functional capabilities; • a slight increase in flightcrew workload, such as routine flight plan changes; or • some physical discomfort to passengers or cabin crew.
Major	Failure conditions that would reduce the capability of the aeroplane or the ability of the flightcrew to cope with adverse operating conditions to the extent that there would be, for example: • a significant reduction in safety margins or functional capabilities; • a significant increase in flightcrew workload or in conditions impairing flightcrew efficiency; • discomfort to the flightcrew; or • physical distress to passengers or cabin crew, possibly including injuries.

~~**Hazardous**~~	~~Failure conditions that would reduce the capability of the aeroplane or the ability of the flightcrew to cope with adverse operating conditions to the extent that there would be, for example:~~ ~~• a large reduction in safety margins or functional capabilities;~~ ~~• physical distress or excessive workload such that the flightcrew cannot be relied upon to perform their tasks accurately or completely; or~~ ~~• serious or fatal injuries to a relatively small number of persons other than the flightcrew.~~
~~**Catastrophic**~~	~~Failure conditions that would result in multiple fatalities, usually with the loss of the aeroplane. (NOTE: A catastrophic failure condition was defined differently in previous versions of JAR 25.1309 and in accompanying advisory material as "a failure condition that would prevent continued safe flight and landing.")~~

Note: as a result of the deletion of this table the references to this table in flow chart 1 and 2 box E and chapter 5 of AMC 25.1707 will also be replaced by a reference to AMC 25.1309.

11. Descriptive text for flowchart 1

.....

b. (1) Use the results of the FHA (BOX A and BOX J) to identify EWIS installation criteria and definitions of component characteristics.

b.(2)(i) Ensure that the EWIS component qualification satisfies the design requirements and that components are selected, installed, and used according to their qualification characteristics and the aircraft constraints linked to their location (refer to the requirements of CS 25.1703 and CS 25.1707).

c.(3) Identify and develop a mitigation strategy for the functional failures and adverse effects identified in BOX J. Validation and verification of the mitigation solution should determine if initial objective is fully reached and confirm that this mitigation solution is compatible with existing installations and installation criteria. If the EWIS was the failure cause, the subsequent mitigation strategy developed may introduce new adverse effects not previously identified by the analysis. Check for any new adverse effects and update the aircraft level FHA and other system

safety assessments as necessary.
(*same change in chapter 12*)

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1711 Component identification; EWIS p. 60-63

comment	*57* comment by: *Airbus* §(3): The word "redundancy" should be replaced by "redundancy or particular need". The word redundancy alone does not cover all the original intention, i.e. identification of fly-by-wire cables inside a bundle. The word "critical" should be replaced by the word "particular" as "critical" far exceeds the need identified by the rule. §§ (3), (8)(b), (8)(c): It may not be practically feasible to mark the required identification data on every kinds of EWIS component as defined in 25.1701. For example, detailed identification of connector accessories, shields, clamps, cable tie devices… may not be practical. This was covered in the original proposal.
response	*Partially accepted* Proposal for para 3: Partially accepted: Redundancy for other reasons than compliance with the requirements is not addressed by the AMC. The Agency replaces the term "critical systems" with "these systems" to make it clear this text refers to systems covered by the requirements of § 25.1711(b). Proposal for para 3, 8.b and 8c: Noted. The comment is agreed. This subject is already discussed in para 5.c.

comment	*86* comment by: *AEA* AMC 25.1711 - Component identification; EWIS – sect 5; [page 61] AMC 25.1711(d) "Subparagraph 25.1711(d) requires that the means used to identify an EWIS component may not have an adverse effect on component performance throughout its design life" The proposed rulemaking mentions on page 61 that EASA will discourage the use of hotstamping equipment. The term discouraging is not clear enough for AEA; We would like to see a statement whether hotstamping is allowed or not. In case of not allowing hot stamping, EASA shall consider the additional implementation time necessary to comply with the rulemaking. In case of not allowing hotstamping all companies shall buy new equipment, which will increase delivery times for the manufacturers.
response	*Not accepted* Hot-stamping is not prohibited. AMC 25.1711 paragraph 5.b provides for the necessary cautionary information with regard to hot-stamp marking.

comment	*111* comment by: *Boeing* Paragraph 8.a., Component Manufacturer Part Number, provides specific instructions for marking component parts. The guidance for this section should be directed and disseminated to the appropriate organizations responsible for certification of EWIS components and for the markings of component parts, as well. Justification: The airframe manufacturer has only limited control over part markings of components used throughout the industry.
response	*Noted* The airframe TC holder/applicant is responsible for compliance with all CS-25 requirements. In any case CS-25 and its AMCs are readily accessible to any person on the EASA website.

resulting text	AMC 25.1711 3. ……. Such identification will aid the designers and installers of the new system by alerting them to the presence of these ~~critical~~ systems. It will allow them to make appropriate design and installation decisions. ……..

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1713 Fire protection: EWIS p. 64

comment	*58* comment by: *Airbus* Airbus proposes to update the AMC: In the original ATSRAC proposal there was a note to cover fiber optic cables. Without this note there is absolutely no requirement to cover the flammability or self-extinguishing of such optical cables, whereas their "insulation/jacket" is subject to the same environmental heating.
response	*Not accepted* Fiber-optics are not part of EWIS and therefore Subpart H does not apply.

comment	*108* comment by: *Boeing* Paragraph 3 states: *"Subparagraph 25.1713(b) requires that insulation on electrical wire and electrical cable installed anywhere in the aeroplane be self-extinguishing when tested in accordance with the applicable portions of part I appendix F of CS 25.* Boeing recommends that the following note be added at the end of this statement: *"Small lengths of wires inside an LRU are exempt from this test and the requirements of CS 25.1713."* Justification: Small lengths of wires inside a box do not pose the same hazard as the general

	purpose wires used on the airplanes.
response	*Not accepted* Wires inside an LRU are not part of EWIS definition. The concern of the comment provider is already addressed in AC 25.16.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1717 Circuit protective devices: EWIS p. 64-65

comment	*59* comment by: *Airbus* The original ATSRAC proposal (25HAC/ACJ 1719) contained an important advice on CB frequent actuation, which is now missing.
response	*Noted* The use of circuit breakers as switches is now addressed by the new CS 25.1357(f) and its AMC.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1721 Protection of EWIS p. 65-66

comment	*60* comment by: *Airbus* §(2): The wording "when distance between both is smaller than …" should be added at the end of the sentence. A tolerance for such requirement would be required as some fuel lines are inside the fuselage.
response	*Partially accepted* The text is adjusted to better explain its intent: … Additionally, wires should not be routed between aircraft skin and fuel lines <u>in the same plane.</u>
comment	*112* comment by: *Boeing* Paragraph 2 states: " . . . *EWIS* cannot *be located in cargo or baggage compartments if its damage or failure may affect safe operation unless it cannot be damaged by movement of cargo or baggage in the compartment and unless its breakage or failure will not create a fire hazard."* We suggest revising the wording as follows *" . . . EWIS cannot be located in cargo or baggage compartments if its damage or failure may affect safe operation unless it cannot be damaged by <u>normal</u> movement of cargo or baggage in the compartment and unless its breakage or failure will not create a fire hazard."* Justification: As indicated in our comments to the related proposed rule language, Boeing requests that this wording be revised to indicate that EWIS components should not be damaged under <u>normal</u> movement of cargo or baggage. This word change will clarify the requirements.

response	*Not accepted* In line with comment 103 resolution.

resulting text	AMC 25.1721 ..... 2. ... … Additionally, wires should not be routed between aircraft skin and fuel lines in the same plane.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Subpart H - AMC 25.1723 Flammable fluid protection: EWIS p. 66

comment	*61* comment by: *Airbus* Last §: The wording "as explosion proof…industry standard" should be replaced by "as to minimize risks of arcing or sparking". This new requirement, as written, was never discussed and will ask for numerous new component developments without any justification.
response	*Partially accepted* The text is amended to indicate that qualification as explosion proof is only necessary when appropriate.

comment	*113* comment by: *Boeing* This AMC states: *"EWIS components located in fuel vapour zones should be qualified as explosion proof in accordance with Section 9 of EUROCAE ED-14 / RTCA Document DO160 or other equivalent approved industry standard. The possibility of contamination with flammable fluids due to spillage during maintenance action should also be considered."* We request that EASA reconsider inclusion of this section. Justification: Most, if not all, EWIS components cannot be tested for "explosion proofness."
response	*Partially accepted* The Agency recognises that not all EWIS components can be tested in accordance with the quoted standards. The text is amended to indicate that qualification as explosion proof is only necessary when appropriate.

resulting text	AMC 25.1723 ..... EWIS components located in fuel vapour zones should be qualified as explosion proof, where appropriate, in accordance with Section 9 of EUROCAE ED-14 / RTCA Document DO160 or other equivalent approved industry standard. The possibility of contamination with flammable fluids due to spillage during maintenance action should also be considered.

B. Draft Rules - I. Amendments to CS-25 - New and amended AMC to CS-25, Book 2 - new AMCs to Appendix H - AMC Appendix H 25.4(a)(3) - AMC Appendix H25.5 p. 66-68

comment

15 comment by: *Transport Canada Civil Aviation Standards Branch*

Document Text
"In accordance with subparagraph H25.4(a)(3) the applicant must prepare Instructions for Continued Airworthiness (ICA) applicable to EWIS as defined by 25.1701 that are approved by the Agency and should include the following:"
Proposed Text/ Comment
It is suggested that the CS-25 Appendix H25.5 and AMC Appendix H25.5 paragraphs be coordinated, as appropriate.
Justification
When comparing the provisions of H25.5 and AMC Appendix H25.5, the AMC appears to add a requirement, over and above the CS-22 paragraph, that the EWIS ICAs be approved. Therfore, the appearance is that two paragraphs are not coordinated.

response

Accepted

As a result of comment nr. 50 the words "are approved by the Agency" are deleted from the AMC.

comment

79 comment by: *Airbus*

The introductory sentence in this AMC should be corrected as follows:
In accordance with subparagraph ~~H 25.4(a)(3)~~ ***H25.5*** the applicant must prepare Instructions for Continued Airworthiness (ICA) applicable to EWIS as defined by 25.1701 that are ~~approved by~~ ***acceptable to*** the Agency and should include the following:

The introductory sentence in this AMC wrongly refers to subparagraph H25.4(a)(3), which in fact does not require that the applicant prepare ICA for EWIS that are approved by the Agency. It simply requires introduction of possible mandatory replacement times of EWIS components into the Airworthiness Limitations section. In another comment form, Airbus proposes to delete §(a)(3).
Except the Airworthiness Limitations section, which has to be "Approved", the status of the Instructions for Continued Airworthiness is not specified in CS 25.1529 and Appendix H. The FAA uses the term "acceptable to the Administrator", and the same interpretation has been used in Europe. There is no reason to address ICA for wiring systems in a different manner than other ICA as described in paragraph H25.3.

response

Noted

As a result of comment nr. 50 the words "are approved by the Agency" are deleted from the AMC.

comment

26 comment by: *AIRBUS TRANSPORT INTERNATIONAL snc*

Instructions for Continued Airworthiness (ICA) are approved by the Agency. Chapter 5 of AMC Appendix H25.5 says that the ICA should contain electrical load data and instructions to update these data.

It should be specified more clearly which electrical load data are required to be in the approved part of the aircraft's ICA. We believe only data linked to the aircraft electrical capacity should be kept in the approved part, and not the actual electrical load of each bus.

Indeed, some changes may impact the load of an electrical bus, and therefore need the update of the aircraft Electrical Load Analysis (ELA), but may not require a major approval from the Agency.
Justification:
Clarification.

response *Noted*

As a result of comment nr. 50 the words "are approved by the Agency" are deleted from the AMC.

Irrespective of the approval needs and classification criteria, ELA data that are part of the ICA as detailed in AMC Appendix H25.5 need to reflect the actual electrical loads of the aircraft as certified.

comment *18* comment by: *Transport Canada Civil Aviation Standards Branch*

Document Text
"AMC Appendix H25.5
Instructions for Continued Airworthiness applicable to EWIS
In accordance with subparagraph H 25.4(a)(3) the applicant must prepare Instructions for Continued Airworthiness (ICA) applicable to EWIS as defined by 25.1701 that are approved by the Agency and should include the following"

Proposed Text/ Comment
TCCA respectfully suggests that the AMC include additional clarification, which reflects the intent of the following statement:
"Where EZAP is included within an MRB Report approved by the MRB Chairperson, that approval is the ICA approval required for paragraph 1a. to 1e. below."

Justification
TCCA finds that it is not entirely clear to whom the term "the Agency" refers in the affected paragraph. A similar statement within the FAA's proposed equivalent rulemaking effort [NPRM Notice No. 05-08] would result in a duplication of approvals for those EZAP tasks that are currently developed via the Maintenance Review Board process. The FAA proposed process would have the FAA AEG at the MRB Report level review and approve the EZAP tasks and then subject them to further review and approval by the FAA ACO when the EZAP is included as part of the overall EWIS ICA. It is noted that all MRB Report approvals are now internationally coordinated amongst the participating authorities to ensure international harmonization and standardization. A non-approval or an additional requirement at the FAA ACO level could expose the OEM and the partnering Authorities to undue delays or, potentially, different EZAP programs in terms of final approval and acceptance of the EWIS EZAP ICAs. A clarification in the AMC could preclude confusion as to the intent of this Agency requirement.

response *Partially accepted*

As a result of comment nr. 50 the words "are approved by the Agency" are deleted from the AMC.

comment	*16* comment by: *Transport Canada Civil Aviation Standards Branch* Document Text "In accordance with subparagraph H25.4(a)(3) the applicant must prepare Instructions for Continued Airworthiness (ICA) applicable to EWIS as defined by 25.1701 that are approved by the Agency and should include the following" Proposed Text/ Comment The reference to H25.4(a)(3) in AMC Appendix H25.5 appears to be incorrect. It would appear that the reference should be to H25.5. Justification It would appear that subparagraph H 25.4(a)(3) requires, more specifically, that any mandatory replacement times for EWIS components be included in the Airworthiness Limitations section of the Instructions for Continued Airworthiness. Appendix H25.5 provides: "The applicant must prepare Instructions for Continued Airworthiness applicable to Electrical Wiring Interconnection System as defined in CS 25.1701. (see AMC Appendix H25.5)
response	*Accepted* The reference is corrected

resulting text	In accordance with subparagraph H 25.~~4(a)(3)~~5 the applicant .....

B. Draft Rules - II. Amendment to Commission Regulation (EC) No. 2042/2003 Part M p. 69

comment	*4* comment by: *Baines Simmons Limited* It is noted that this part of the NPA proposes an amendment to Part 66 Appendix 1, Basic knowledge requirements paragraph 7.7 of module 7. We are concerned that this is not separately identified for comment and could be open to challenge in the future. We would however comment that we support the amended proposal.
response	*Noted* The Part 66 element was part of the NPA and open for comments.

comment	*12* comment by: *DGAC France* Delete M.A.706. JUSTIFICATION: The impact of this new requirement which is wider than EWIS on large transport aeroplanes has not been properly assessed: 1) The initial airworthiness part of this NPA is only dealing with issues impacting large aeroplanes (CS25 amendments). Regarding continuing airworthiness, it is a bit strange to add a requirement in Part M, Sub part G that would address all CAMO, including those not involved in commercial transport category or large aeroplanes user. In addition it would become

applicable to non complex aircraft at a time where EASA is trying to set up a light aircraft regulation less stringent.

2) The need for the authority to "agree" on such a procedure is not justified. A reference to , as compared to "officially recognized standard" as for other MA.706 requirements might be more appropriate.

3) The NPA justifies this requirement as an alignment with Part 145 requirements. (145.A.30 (e)) However Part 145 is only applicable to large aircraft. In addition, the Part 145 requirement is complemented by an AMC and there is none to complement this new MA.706 (i) requirement.

4) The requirement added in M.A.706 (i) is not restricted to EWIS but address all CAMO activities.

response *Partially accepted*

1. Partially accepted. The applicability of the paragraph will be limited to commercial air transport and/or large aircraft which is then consistent with the applicability of Part 145. This provision is not only applicable to EWIS but needed to make sure that all personnel involved in airworthiness related activities is trained properly in all relevant issues including EWIS. If for the particular aircraft there are no specific EWIS training requirements the provision is not applicable to EWIS.

2. Not accepted. The wording is consistent with Part 145.A.30(e) terminology

3. Partially accepted. Part 145 is mandatory for commercial air transport and large aircraft but can also be used for other categories. See also 1 above. The new AMC M.A.706(f) is renumbered AMC M.A.706(i) and is applicable to the new subparagraph.

4. Accepted. See 1 above.

comment *21* ❖ comment by: *Luftfahrt-Bundesamt (LBA)*

Concerning the amendment of Part-66 Appendix I (Basic knowledge requirements, paragraph 7.7 of module 7) LBA in general supports the aim of this NPA. Nevertheless, from our point of view the change of Part-66 should not be implemented within the current NPA process.

Justification:
Such a change, though it seems to be a minor one, will raise several problems for maintenance organizations, license holders and the competent authorities which will lead to an increase of time and cost.

Some questions are:
- What about licenses issued before?
- Is there a transition period?
- What about granted Grandfather Rights or JAA-licenses according to article 5 of Commission Regulation (EC) 2042/2003?

Aircraft maintenance training rules in most cases were derived from more or less painful accidents like the mentioned ones. The complete aircraft is constructed of parts all of them endangered by wrong handling and treatment disregarding protecting rules.

Nevertheless many items of Appendix I to Part-66 are to be trained in Level 1 or 2. For each of them a critical malfunction caused by someone may be found in the past. Two aircraft lost 9 and 11 years ago, although hurtful by itself, may therefore not justify such a change. It might be that the knowledge of the mentioned problem has been grown in the past, but there is no hint to be found in the Explanatory Note of the NPA.

To summarize it there is no evidence that the change of this particular part of Appendix 1 of Part-66 will improve the safety level at all. It will raise cost for all parties with unclear benefit.

LBA therefore suggests to skip chapter II, sub-part (b) of this NPA. Instead of that a particular NPA process should be raised based on information about the lack of basic training in current maintenance systems.

response *Partially accepted*

Specifically the findings of the IIWG demonstrated the need to emphasise EWIS in the maintenance programme and the importance of EWIS training for maintenance personnel. This is covered adequately by NPA 2007-01. Initiating an additional NPA process would be of questionable benefit and time consuming.
An appropriate transition period of 18 months will be established in the final opinion by delaying the applicability of the amendment to Part 66.

comment *23* comment by: *Air France*

M.A .706 personnel requirements b)

PROPOSED TEXT/ COMMENT: Same training level 2 or 3 for B1 and B2

JUSTIFICATION: B1 and B2 are qualified staff performing E.W.I.S maintenance. They are involved in the same repairs and inspections tasks. Cf : Appendix A . P112 of 148

response *Accepted*

In accordance with comment nr. 13 the levels will be 3 for both B1 and B2.

comment *89* comment by: *AEA*

The aim of basic regulation is to establish common standard for the civil aviation in EU. In the amendment of EC regulation is set that "*The organisation shall establish and control the competence of personnel involved in the continuing airworthiness management, airworthiness review and/or quality audits in accordance with a procedure and to a standard agreed by the competent authority*."

Each competent Authority can accept different standard for EU operators in contradiction with the aim of Basic Regulation

response *Noted*

The comment goes beyond the scope of this NPA. All maintenance requirements are implemented by the competent authorities and the need for standardisation is balanced with the practical concept of proximity. The Agency

cannot approve the standards used by thousands of maintenance organisation.

comment *13* comment by: *DGAC France*

II. Amendment to Commission Regulation (EC) N° 2042/2003
b. *Amendment to Part 66 Appendix I, Basic knowledge requirements paragraph 7.7 of module 7 :*

modify the B1 categorie level ("3" instead of "2") in the Part 66, appendix I, paragraph 7.7 of module 7 as follows:

	Level		
	A	**B1**	**B2**
7.7 Electrical ~~Cables and Connectors~~ Wiring Interconnection System (EWIS) ….	1	~~2~~ 3	~~2~~ 3

JUSTIFICATION:

Subject 7.7 should also be modified at level 3 for the B1 category since the theoretical contents of module 3 (Electrical Fundamentals), 6.11(Electrical Cables and Connectors) and 7.7 (Electrical Cables and Connectors) are identical for the two categories (B1 and B2).

Moreover, the level of intervention on electric wiring is identical for a B1 or a

response *Accepted*

resulting text

Amendment to Regulation (EC) No 2042/2003

Part M:

M.A.706(i) For all large aircraft or for aircraft used for commercial air transport, the organisation shall ……

Part 66 Appendix I:

7.7 Electrical ~~Cables and Connectors~~ Wiring Interconnection System (EWIS)	1	~~2~~3	3

Article 2
Entry into force
This Regulation *[amending 2042/2003]* shall enter into force on *[day after publication]* except for M.A.706(i) of Part M which shall enter into force on *[18 months after entry into force]*.

AMC/GM to Part M:

AMC M.A.706(fi)
Personnel Requirements
Adequate initial and recurrent training should be provided and recorded to ensure continued competence.

B. Draft Rules - IIII. Amendments to AMC/GM to Part M p. 69-70

comment *29* comment by: *Aircraft Electronics Association - Europe*

AMC M.A.706(f) - Personnel Requirements
Adequate initial and recurrent training should be provided and recorded to ensure continued competence.

The term "Adequate" must be defined.

Justification:
In order to assure standardization across all European Union members EASA must better define and describe their meaning of the term "adequate".

As proposed the word "Adequate" is a subjective word open for interpretation by each EU member state thereby allowing some member states to define the term with a basic criterion while other member states may define the term at a higher training and recurrent training standard.

response *Not accepted*

"adequate" is used to allow for the necessary flexibility: the training needs should be tailored to the scope of work of the organisation. The wording is consistent with the relevant AMC to Part 145.

comment *31* comment by: *Aircraft Electronics Association - Europe*

AMC M.A.706(f) - Personnel Requirements

Adequate initial and recurrent training should be provided and recorded to ensure continued competence.

The training curriculum of AMC 20-22 should be a recommended curriculum but only required to instruct those topics applicable to individual maintenance assignments.
Justification:
As explained in the "Explanatory Notes" this proposal was formed by ATSRAC to address the certification aspects of wiring systems on large transport category aeroplanes. The applicability to light aircraft is in question.
The training proposal as required by AMC 20-22: Aeroplane Electrical Wiring Interconnection System training programme is excessive for basic maintenance organizations and covers numerous topics that may not apply to every maintenance engineer.

Many topics such as LRU replacement general practices, Certification considerations (e.g. CAT 2/CAT3 Landing), LRU re-racking procedures, and Built in test equipment (BITE) may not be applicable to personnel performing maintenance on light aircraft.

response | *Partially accepted*

It is agreed to limit the applicability of the new paragraph to large aircraft or commercial air transport.
AMC 20-22 is not a requirement and should be applied only as far as applicable to the scope of work of the organisation.

comment | *90* comment by: *AEA*

Concern regarding compliance with AMC M.A. 302 , will the operators have to establish an agreement with all holders of ETSO products/equipment installed on their fleet to require to be in the mailing of any mandatory requirements

response | *Noted*

The AMC asks the documentation as issued by the various design approval holders to be reflected in the maintenance programme. An "agreement" with those approval holders may not be necessary to achieve that.

Note: During the comments review it was discovered that the paragraph of AMC M.A.302 which was intended to be changed by this NPA was moved into Part M itself (M.A.302(g)) by Regulation (EC) No. 707/2006. Therefore the intended change is now envisaged for the relevant Part M provision. (see resulting text below)

resulting text

Regulation (EC) No 2042/2003

Part-M:

M.A.302
.....
(g) The maintenance programme must reflect applicable mandatory regulatory requirements addressed in documents issued by the ~~Type Certificate~~ holder of the type certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, ETSO authorisation or any other relevant approval deemed to have been issued under Commission Regulation 1702/2003 to comply with ~~Part 21A.61~~ the requirements for issuance of instructions for continued airworthiness in Part-21.

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-21: Definitions p. 74-75

comment | *19* comment by: *KLM Engineering & Maintenance*

PROPOSED TEXT/ COMMENT:
Add the bold text to the paragraph:
Lightning/High Intensity Radiated Field (L/HIRF) protection: The protection of aeroplane electrical systems and structure from induced voltages or currents by means of shielded wires, raceways, bonding jumpers, connectors, composite fairings with conductive mesh, static dischargers, and the inherent conductivity of the structure or **the current return network (CRN) for airplanes with non-conductive composite structure**; may include aircraft specific devices, e.g., RF Gaskets.

	JUSTIFICATION: New airplane designs, such as the Boeing 787 will comprise at least 85% composite structure that does not provide "faraday cage" protection or a structural current return path for the electrical system.
response	*Not accepted* The proposed wording is design specific and is judged not to add to the clarity of the definition.

resulting text

3 Applicability. The guidance provided in this document is directed to operators, type certificate applicants and holders, STC ~~holders~~applicants and maintenance ~~providers~~organisations: ~~(1) The holders of type certificates for large aeroplanes provided the type certificate was issued after January 1, 1958, and the aeroplane has a maximum type certificated passenger capacity of 30 or more, or a maximum type certificated payload capacity of 7500 pounds or more. (2) The holders of supplemental type certificates for aeroplanes described in paragraph (a)(1) of this chapter, where the STC may cause wiring to be installed, removed, altered, disturbed, subjected to contamination, or may cause a change in the wiring system's operating environment.~~

6 Definitions

.....

Electrical Wire Interconnection System (EWIS): ~~An electrical connection between two or more points including the associated termination devices (e.g., connectors, terminal blocks, splices) and the necessary means for its installation and identification. (See Appendix D, Electrical Wire Interconnection System.)~~ See CS 25.1701

Appendix D. ~~Electrical Wiring Interconnection System.~~ (Reserved)~~As stated in the definitions section of this AMC "Electrical Wiring Interconnection System" (EWIS) is defined as follows:An electrical connection between two or more points including the associated termination devices (e.g., connectors, terminal blocks, splices) and the necessary means for its installation and identification.The definition of "EWIS" includes the following:• Wires (e.g., wire, cable, coax, databus, feeders, ribbon cable).• Bus bars.• Connection to electrical devices (e.g., relays, push button, interrupters, switches, contactors, terminal blocks, feed-through connectors).• Circuit breakers or other circuit protection devices (not performance).• Electrical contacts.• Connector and accessories (e.g., backshell, sealing boot grommet sealing plugs).• Electrical grounding and bonding devices (e.g., modules, straps, studs).• Electrical splices.• Shield or braids.• Conduits that have electrical termination.• Clamps and other devices used to route and support the wire bundle.• Cable tie devices.• Labels or other means of identification methods.• Pressure seals associated with EWIS.• Wiring inside shelves, panels, racks, junction boxes, distribution panels, back-planes of equipment racks (including circuit board back-planes), wire integration units, etc.The following wires and devices (along with the mating connections at the termination points of the wire on those devices) are not considered part of the "EWIS":• Wiring inside avionics equipment (e.g., flight management system computer, flight data recorder, VHF radio, primary flight display).• Equipment qualified to the standards of RTCA Document DO-160 or shown to be equivalent (other than those specifically included in this definition).• Equipment qualified to a technical standard order (TSO).• Portable, carry on, or otherwise non-permanently mounted (not part of the certification basis) electrical equipment.• Fibre optics.~~

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-21: Appendix C: Determination If a Major Change to an Aircraft should be specifically subjected to an EZAP p. 99-101

comment	*22* ❖ comment by: *Deutsche Lufthansa AG* Part A, Chp. V, para 4.2; para 5 Part B, Chp. IV, AMC 20-21 Appendix C Part B, Chp. V General comments to maintenance programme related action items: Based on NPA 2007-01 Part A, Chp. V, para 4.2 proposed options (1 thru 5) the EASA has been concluded as per para 5, that option 4 is the preferred approach (refer to pages 21 thru 24 of NPA). Option 4 is limited to retro-active EZAP applicable to TC holders only - with STC issues definitely excluded by explained reasons. Consequently this limited approach has been incorporated into Part B, Chp. V for the intended AD (refer to page 148). By contrast, with reference to included Part B, Chp. IV, AMC 20-21 Appendix C is stated that: - the operator should collaborate with TC/STC holders to obtain information required to conduct EZAP analysis; - in situations where installed STC is no longer supported by viabel STC holder….the responsibility is assigned to individual operators… In cases the operator does not have experience in application of analysis it will be necessary for the operator to gain competence…etc. Taking into account preferred Option 4 versus requirements as per AMC 20-21 the operator's responsibility is not clearly defined in regard to STC issues. Please advice a summarized statement as guidance for operators in this specific issue under consideration of all Parts / Chapters of this NPA. Moreover, the status of EZAP Maintenance Tasks is unclear. We suppose, the policy might be similar to L/HIRF tasks (may be escalated but must not deleted from operator's maintenance programme). Please advice the intended status / related restrictions for EZAP tasks. Justification: - Clarification of operator’s responsibility in particular for STC-relevant EZAP issues under consideration of all Parts / Chapters of this NPA. - Clarification of intended status / related restrictions for EZAP tasks.
response	*Noted* Option 4 means that the new rules are applicable to all new applications but that the "retroactive" requirement is only applicable to existing TCs. The intended AD only addresses existing TCs, whereas the AMC is also and primarily applicable to new applications for both TC and STC. Therefore there is no inconsistency in the proposals. The applicable requirements for TC and STC applicants are defined under Part 21 and not by the AMC. The operator's responsibility is to implement in its maintenance programmes the updated instructions for continued airworthiness as issued by the TC and/or STC holder in accordance with the relevant provisions of Part M or

applicable airworthiness directive as appropriate.

The status of EZAP items is explained in AMC 20-21 chapter 11 step 9. They should be uniquely identified and cannot be deleted during maintenance programme development.

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-22 p. 105

comment *87* comment by: *AEA*

AMC 20-22: Aeroplane Electrical Wiring Interconnection System Training Programme

8.Essential elements for a Training Programme

Sufficient time to implement and perform initial training to the personnel concerned should be given (lessons learned from ED Decision 2007-001-R).

response *Accepted*

An appropriate transition period shall be established in the Opinion. See also response to comment nr. 21.

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-22: Objective p. 105-106

comment *30* comment by: *Aircraft Electronics Association - Europe*

Target groups should be identified in a consistent manner.

Justification:
In Paragraph 2 the target groups are identified alphabetically from (a) to (h). However in Appendix 1 and Appendix 2, the groups are identified numerically from (1) to (8).

The identification of target groups should have a consistent "group number".

response *Not accepted*

The suggested consistency does not align with the general numbering logic of the AMC.

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-22: Definitions p. 109-111

comment *19* ❖ comment by: *KLM Engineering & Maintenance*

PROPOSED TEXT/ COMMENT:
Add the bold text to the paragraph:
Lightning/High Intensity Radiated Field (L/HIRF) protection: The protection of aeroplane electrical systems and structure from induced voltages or currents by means of shielded wires, raceways, bonding jumpers, connectors, composite fairings with conductive mesh, static dischargers, and the inherent conductivity of the structure or **the current return network (CRN) for airplanes with non-conductive composite structure**; may include aircraft

specific devices, e.g., RF Gaskets.

JUSTIFICATION:
New airplane designs, such as the Boeing 787 will comprise at least 85% composite structure that does not provide "faraday cage" protection or a structural current return path for the electrical system.

response

Not accepted

The proposed wording is design specific and is judged not to add to the clarity of the definition.

resulting text

6 Definitions

.....

Electrical Wire Interconnection System (EWIS): ~~is defined by~~ See CS 25 ~~Subpart H,~~ 25.1701 ~~as follows:(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 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 paragraph (a) of this section 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 and wire integration units.(c) Except for the equipment indicated in paragraph (b) of this section, EWIS components inside the following equipment, and the external connectors that are part of that equipment, are excluded from the definition in paragraph (a) of this section:(1) Electrical equipment or avionics that are 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.~~

B. Draft Rules - IV. Amendments to AMC-20 - AMC 20-23: Purpose p. 136

comment

32 comment by: *Aircraft Electronics Association - Europe*

Define "field approval modifications or repairs". This is a US FAA term which may not have the same meaning in Europe.
Justification:
This AMC provides guidance for developing an electrical standard wiring practices document for operators, holders of type certificates, holders of supplemental type certificates (STCs), maintenance organisations, repair

	stations and persons performing field approval modifications or repairs.
response	*Accepted* Wording is adjusted to the European terminology.

resulting text

1 Purpose
..... maintenance organsations, ~~repair stations and persons performing field approval modifications or repairs~~ .....
3 Applicability
..... maintenance organsations, ~~repair stations and persons performing field approval modifications or repairs~~ .....
.....
6 Definitions
.....
Electrical Wire Interconnection System (EWIS): ~~is defined by~~ See CS 25 ~~Subpart H,~~ 25.1701 ~~as follows:(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 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 paragraph (a) of this section 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 and wire integration units.(c) Except for the equipment indicated in paragraph (b) of this section, EWIS components inside the following equipment, and the external connectors that are part of that equipment, are excluded from the definition in paragraph (a) of this section:(1) Electrical equipment or avionics that are 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.~~

B. Draft Rules - V. Intended Airworthiness Directives p. 145

comment

22 ❖ comment by: *Deutsche Lufthansa AG*

Part A, Chp. V, para 4.2; para 5
Part B, Chp. IV, AMC 20-21 Appendix C
Part B, Chp. V
General comments to maintenance programme related action items:

Based on NPA 2007-01 Part A, Chp. V, para 4.2 proposed options (1 thru 5)

the EASA has been concluded as per para 5, that option 4 is the preferred approach (refer to pages 21 thru 24 of NPA).

Option 4 is limited to retro-active EZAP applicable to TC holders only - with STC issues definitely excluded by explained reasons. Consequently this limited approach has been incorporated into Part B, Chp. V for the intended AD (refer to page 148).

By contrast, with reference to included Part B, Chp. IV, AMC 20-21 Appendix C is stated that: - the operator should collaborate with TC/STC holders to obtain information required to conduct EZAP analysis;
- in situations where installed STC is no longer supported by viabel STC holder….the responsibility is assigned to individual operators… In cases the operator does not have experience in application of analysis it will be necessary for the operator to gain competence…etc.
Taking into account preferred Option 4 versus requirements as per AMC 20-21 the operator's responsibility is not clearly defined in regard to STC issues.

Please advice a summarized statement as guidance for operators in this specific issue under consideration of all Parts / Chapters of this NPA.
Moreover, the status of EZAP Maintenance Tasks is unclear. We suppose, the policy might be similar to L/HIRF tasks (may be escalated but must not deleted from operator's maintenance programme).

Please advice the intended status / related restrictions for EZAP tasks.

Justification:
- Clarification of operator’s responsibility in particular for STC-relevant EZAP issues under consideration of all Parts / Chapters of this NPA.
- Clarification of intended status / related restrictions for EZAP tasks.

response *Noted*

Option 4 means that the new rules are applicable to all new applications but that the "retroactive" requirement is only applicable to existing TCs. The intended AD only addresses existing TCs, whereas the AMC is also and primarily applicable to new applications for both TC and STC. Therefore there is no inconsistency in the proposals. The applicable requirements for TC and STC applicants are defined under Part 21 and not by the AMC.
The operator's responsibility is to implement in its maintenance programmes the updated instructions for continued airworthiness as issued by the TC and/or STC holder in accordance with the relevant provisions of Part M or applicable airworthiness directive as appropriate.
The status of EZAP items is explained in AMC 20-21 chapter 11 step 9. They should be uniquely identified and cannot be deleted during maintenance programme development.

comment *80* comment by: *Airbus*

Pages 145-148 Airbus objects to the possible use of Part 21A.3B (Airworthiness Directives), as a means to require design approval holders to produce instructions for continued airworthiness derived from applying an Enhanced Zonal Analysis Procedure. Instead, Airbus suggests that the Agency consider a new set of airworthiness specifications (like JAR-26), possibly in conjunction with an amendment to Part M.

	Justification: 1/ Part 21A.3(b) requires the following: (b) The Agency shall issue an airworthiness directive when: 1. an unsafe condition has been determined by the Agency to exist in an aircraft, as a result of a deficiency in the aircraft, or an engine, propeller, part or appliance installed on this aircraft; and 2. that condition is likely to exist or develop in other aircraft. Under the traditional interpretation of this paragraph, airworthiness directives are issued to correct identified deficiencies that may lead to unsafe conditions in a well-defined group of aircraft (type, series...) or equipment, in order to restore the level of safety within this defined group, to the level that was targeted by the initial type certification (see GM 21A.3B, paragraph 2). Airworthiness directives are not the right tool to implement measures of general applicability that are meant to enhance the general level of safety beyond the one intended by the existing rules. 2/ The practicality of using airworthiness directives in this case is questionable, since the Agency would likely be overwhelmed with the need to address not only type certificate holders, but also all holders of STC involving wiring systems, in a limited timeframe. 3/ ICAO Annex 8 requires that the State of Design (in Europe represented by EASA) inform all States of Registry of the airworthiness directives it issues, for adoption or appropriate action. If EASA unilaterally extends the traditional scope of airworthiness directives towards measures of general safety improvement, it may cause misunderstandings and incompatibilities with the regulatory systems of other ICAO contracting States. 4/ The need to create a rule mandating the type certificate holder to develop new ICA using EZAP is questionable. An alternative approach would be to simply mandate that the operator must update his maintenance programme by a particular date to address ageing wiring concerns using the EZAP methodology. Under the existing practices, Airbus has always taken an active part in aging aircraft rulemaking, be it related to structures or systems, and provided its customers with related information and compliance data in advance of actual or even potential regulatory deadlines. Normal commercial relationships between Airbus and operators of Airbus products have resulted in a satisfactory solution to providing data necessary for them to comply with new requirements. 5/ Another approach, initially considered by the FAA, was to introduce continued airworthiness and safety improvement requirements into a new subpart to FAR Part 25. In several occasions, in particular when commenting on NPRM 05-08, Airbus expressed its deep concern about this approach as well. We understand that the FAA is now considering other solutions, such as a new FAR Part, to locate those requirements. We suggest that the Agency, instead of using airworthiness directives, similarly consider a new set of airworthiness specifications, possibly in conjunction with an amendment to Part M.
response	*Partially accepted* The Agency finds that the provisions of 21A.3B(c)(1) can be used in this case. In order to make use of this provision the Agency will have to identify the unsafe condition and communicate to the TC holder. The TC holder is then obliged to propose corrective measures for approval by the Agency. If these corrective actions can be implemented through other means than an AD (such as through the applicable provisions of Part M) the Agency can agree not to issue the AD.

1/ ADs are issued to "to restore an acceptable level of safety". The understanding of what is an acceptable safety level can change due to experience. Therefore the Agency finds that Part 21A.3B can be used to address the issue at hand.

2/ The "retroactive" measure does not apply to STC holders.

3/ As explained under 1/ above, the Agency finds that the use of Part 21A.3B is justified. It also accepts that finally the issuance of an AD is not necessary if the corrective action to address the unsafe condition can be mandated by other means such as provisions in Part M. In any case all contracting ICAO states have the responsibility to review Mandatory Airworthiness Information before imposing that on aircraft on their own register.

4/ The alternative suggested by the comment provider is theritically possible but the Agency prefers to put responsibilities where they can best be implemented.

5/ In the light of the extension of scope for EASA to include operations and licensing, rulemaking task 21.039 has started to address this in general terms.

B. Draft Rules - V. Intended Airworthiness Directives - Identification of the affected aircraft types p. 147

comment *2* comment by: *Austro Control GmbH*

Comment: Paragraph V.. item 3(b) should be deleted.
Justification: There is no relation between the payload of the affected aircraft models and the unsafe condition of the discussed subject.

response *Not accepted*

Accepting the comment would exclude a number of aircraft from the applicability that are already addressed by the fuel tank safety initiative. The current applicability is consistent with the FAA EAPAS rule.

B. Draft Rules - V. Intended Airworthiness Directives - Envisaged Compliance Time for the Operators p. 148

comment *34* comment by: *Virgin Atlantic Airways Ltd*

The envisaged compliance date for operators for inclusion of inspections and procedures for EWIS should be 16 December 2009 or 12 months after the publication by the TC holder of the approved inspections/procedures.
Justification:
If the publication by the TC holders of the approved inspections and procedures for EWIS is delayed then this delay should not reduce the amount of time the operator has to comply with the AD, as a considerable amount of time will be needed to amended the maintenance schedule and corresponding job cards.

response *Noted*

The applicability dates will be 10 December 2009 for the TC holders and 12 months after the publication of the revised ICA for the operators.

comment	*88* comment by: *AEA* The envisaged compliance date for operators for inclusion of inspections and procedures for EWIS should be 16 December 2009 or 12 months after the publication by the TC holder of the approved inspections/procedures, which ever is later. Justification: If the publication by the TC holders of the approved inspections and procedures for EWIS is delayed then this delay should not reduce the amount of time the operator has to comply with the AD, as a considerable amount of time will be needed to amended the maintenance schedule and corresponding job cards.
response	*Noted* The applicability dates will be 10 December 2009 for the TC holders and 12 months after the publication of the revised ICA for the operators.

B. Draft Rules - V. Intended Airworthiness Directives - Excluded Aeroplanes p. 148

comment	*1* comment by: *Austro Control GmbH* Comment: The five aircraft models listed under item 7 of paragraph V. should also be included in the intended AD. Justification: It is assumed that those specific aircraft models also show evidence of an unsafe condition according Part 21A.3B(c)(1).
response	*Not accepted* The proposed applicability is consistent with the fuel tank safety initiative and the FAA EAPAS rules.

comment	*27* comment by: *Viking Air Limited* PROPOSED TEXT/ COMMENT: Request that EASA add the DHC-5 (Buffalo) and DHC-7 (Dash-7) to the list of aeroplanes excluded from the EWIS rule. JUSTIFICATION: Viking Air Limited, located in British Columbia Canada, is an experienced aerospace manufacturer that has specialized in de Havilland Canada products for over 30 years. Viking, in January 2006 has acquired Type Certificates for seven de Havilland Canada heritage aeroplanes, including the DHC-5 (Buffalo) and DHC-7 (Dash-7). We request that EASA add the DHC-5 (Buffalo) and DHC-7 (Dash-7) to the list of aeroplanes excluded from the EWIS rule. Justification for the DHC-5 Buffalo: 1. There are only 23 DHC-5 Buffalo aircraft remaining in operation; 2. There are no aircraft in civilian passenger operation; 3. In the future there will be no support for civilian passenger operation;

4. The DHC-5 has no MIL-W-81381 Kapton (polyimide) insulated wires; and,

5. Presently, exclusion is being requested from the proposed Canadian rules. Note: The aircraft does not have a civil type certificate in the United States.

Justification for the DHC-7 Dash-7:

1. There are approximately 46 DHC-7 aircraft remaining in service;

2. Approximately 65% of the Dash-7 fleet operate in remote locations or above the 60th parallel, where typically, there is minimal infrastructure and the Dash-7's STOL capability is of vital importance; Note: The proposed rules may make continued operation in these geographic locations economically non viable.

3. About 18% of the fleet are in are in non civilian operations;

4. The Dash-7 has no MIL-W-81381 Kapton (polyimide) insulated wire; and,

5. Presently, exclusion is being requested from the proposed Canadian rules.

Viking Air Limited is a small entity Type Certificate Holder responsible for supporting a relatively small operating fleet (69 aircraft), to which the proposed rules would be applicable too. Therefore, there will be very little opportunity for amortization or economies of scale.

Viking Air Limited would greatly appreciate EASA taking the foregoing information into consideration when determining applicability of EWIS to the DHC-5 (Buffalo) and DHC-7 (Dash-7) fleets.

response

Not accepted

The proposed applicability is consistent with the fuel tank safety initiative and the FAA EAPAS rules.

Appendix A - Attachments

Letter to EASA NPA 01-2007 June 07.pdf
Attachment #1 to comment #17

UK CAA - Comment Attachment.pdf
Attachment #2 to comment #6