



European Union Aviation Safety Agency
Comment-Response Document 2017-09

Update of AMC-20:
certification of products and parts equipped
with electronic control systems
and
certification of in-flight entertainment (IFE) systems

RELATED NPA: 2017-09 — RMT.0561 — 23.7.2020

EXECUTIVE SUMMARY

This Comment-Response Document (CRD) contains the comments received on Notice of Proposed Amendment (NPA) 2017-09, and the individual responses provided to them by the European Union Aviation Safety Agency (EASA).

The summary in this CRD highlights the most substantial comments received and the corresponding EASA responses.

Based on these comments, EASA has made some changes to the draft proposed amendments to AMC-20.

Note: Rulemaking task RMT.0561 and the related NPA 2017-09 included a proposal to introduce a new AMC 20-30 on lead-free soldering. On this topic, EASA decided to present the comments received and EASA's responses to them as part of a future CRD and Decision.

Action area:	Regular updates		
Affected rules:	AMC-20		
Affected stakeholders:	Aircraft and equipment designers and manufacturers; maintenance organisations; air operators; Member States (MSs)		
Driver:	Efficiency/proportionality	Rulemaking group:	Yes
Impact assessment:	Light	Rulemaking Procedure:	Standard

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1. Summary of the outcome of the consultation

46 comments were made by stakeholders from national aviation authorities, organisations, industry companies and associations.

Note: The comments related to the proposal for a new AMC 20-30 on lead-free soldering are not considered in this CRD. This subject will be included in a future CRD.

The commentators are, in general, supportive of the proposed amendments to the existing AMC 20-1, 20-2 and 20-3, and to the proposed new AMC 20-19 on in-flight entertainment (IFE) systems.

EASA has reviewed all the comments that were received, and further to a number of them, the text proposed in the NPA for the different AMCs has been modified in some parts, for improvement or clarification purposes.

Chapter 2 of this CRD provides the individual comments and EASA's responses to them.



2. Individual comments and responses

In responding to the comments, the following terminology has been applied to attest EASA's position:

- (a) **Accepted** — EASA agrees with the comment and any proposed amendment is wholly transferred to the revised text.
- (b) **Partially accepted** — EASA either partially agrees with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.
- (c) **Noted** — EASA acknowledges the comment, but no change to the existing text is considered to be necessary.
- (d) **Not accepted** — The comment or proposed amendment is not agreed by EASA.

(General comments)	-
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comment	12	comment by: UK CAA
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Thank you for the opportunity to comment on NPA 2017-09.

Please be advised that the UK CAA have no comments.

response	Noted
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comment	13	comment by: Jet Aviation AG, Basel
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In order to harmonize EASA/FAA certification process, and to remove the requirement for an FAA Issue Paper during IFE related FAA validation projects, Jet Aviation would like to trigger EASA's attention to consider following FAA General VI (Validation Item):

'Use of Portable Electronic Devices (PEDs) to Control Installed Aeroplane Systems in the Cabin'

published within FAA Transport Airplane Issues List (currently dated 30.March 2017), Section "Systems and Equipment"

Harmonization in this aspect would ease IFE related FAA validations of EASA approved data.

response	Noted
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This item is not in the EASA SEI list. EASA has no control on the SEI list of the FAA.

comment	51	comment by: Federal Office of Civil Aviation (FOCA), Switzerland
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The Federal Office of Civil Aviation (FOCA) would like to thank the Agency for the opportunity to comment on this NPA.

FOCA supports the proposal, especially the amendment and update of the relevant AMCs to Part ORO and Part-CAT regarding the in-flight entertainment (IFE) system as described.



	<p>FOCA would like to take the opportunity to suggest to mention the in-flight entertainment (IFE) in the GM2 CAT.OP.MPA.170 and in all the cabin crew training courses such as:</p> <ul style="list-style-type: none"> • Initial training course (awareness) ORO.CC.120, • Senior cabin crew member course ORO.CC.200, • Single cabin crew member course ORO.CC.255, • Refresher course ORO.CC.145 and finally also • Recurrent training ORO.CC.140 and checking, <p>depending on operator's operation specifications and where IFE is applicable.</p>
response	<p>Not accepted</p> <p>EASA appreciates the proposal. However, it has not been included in the referenced paragraphs for the following reasons:</p> <p>GM2 CAT.OP.MPA.170 Passenger briefing – SAFETY BRIEFING MATERIAL already covers the element in:</p> <p><i>(10)(i): required position of seatbacks, headrests, tray tables, footrests, window blinds, in-seat video screens and their control gadgets, etc.;</i></p> <p>For hand-held PEDs for use as IFE provided by the operator:</p> <p><i>(9)(ii): use in various flight phases including during safety briefing;</i></p> <p><i>(9)(v): the need to call for immediate assistance in case a device is damaged, hot, produces smoke, is lost, or falls into the seat structure (including advice to refrain from manipulating the seat);</i></p> <p>ORO.CC.120: The initial training is generic training. IFE, if installed in the aircraft, is an operator-related and operator-customised element.</p> <p>ORO.CC.200 Senior cabin crew member: specifies training and conditions for individuals selected by the operator for the position of a Senior cabin crew member (SCCM). In addition to this training, the candidate for an SCCM position has to comply with the provisions required by Annex III, Part-ORO, Subpart CC. The IFE aspect has been proposed for inclusion in AMC1 ORO.CC.125(d) TRAINING PROGRAMME - Operator conversion training and in AMC1 ORO.CC.135 Familiarisation.</p> <p>ORO.CC.255 Single cabin crew operations: specifies training and conditions for individuals selected and assigned by the operator to single cabin crew members operations. In addition to this training, the cabin crew member has to comply with the provisions required by Annex III, Part-ORO, Subpart CC. The IFE aspect has been proposed for inclusion in AMC1 ORO.CC.125(d) TRAINING PROGRAMME - Operator conversion training and in AMC1 ORO.CC.135 Familiarisation.</p> <p>ORO.CC.145 Refresher training: IFE would fall under normal and emergency procedures.</p> <p>ORO.CC.140 Recurrent training: please, refer to paragraph (b) which specifies that Recurrent training shall cover the actions assigned to each member of the cabin crew in normal and emergency procedures and drills relevant to each aircraft type and/or variant to be operated.</p>
comment	<p>62 comment by: Airbus Helicopters</p> <p>(General comment for AMC 20-1A, AMC 20-2A and AMC 20-3A)</p> <p>Comment</p>

	<p>There is a mix usage of “level” (mostly used for software) and “design assurance level” / “DAL” (mostly used for AEH). Although this distinction is in line with the wording differences between ED-12C and ED-80, it fails to show that both wordings correspond to the same concept. Another term, “criticality level”, is also used.</p> <p>Proposal We suggest using a unique wording (i.e. “design assurance level” / “DAL”) for both software and AEH.</p>
response	<p>Accepted</p> <p>The wording ‘criticality level’ is now used consistently in AMC 20-1, 20-2 and 20-3 to replace ‘level’ (for software) and ‘design assurance level/DAL’ (for AEH).</p>
comment	<p>90 comment by: DGAC France</p> <p>Please note that DGAC France has no specific comment on this NPA.</p>
response	<p>Noted</p>
comment	<p>91 comment by: EUROCONTROL</p> <p>The EUROCONTROL Agency welcomes the publication of EASA Notice of Proposed Amendment 2017-09. It also thanks EASA for the opportunity that has been given to submit comments on the NPA. The EUROCONTROL Agency, however, has no comment to make.</p>
response	<p>Noted</p>

3. Proposed amendments and rationale in detail — 3.1. Draft certification specifications (Draft EASA decision) — AMC 20-1A	p. 7-10
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comment	<p>52 comment by: The Boeing Company</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Page: 8-9 Paragraph: <i>bottom of page 8 carrying over to top of page 9</i></p> <p>THE PROPOSED TEXT STATES: AEH development assurance level (DAL)</p> <p>REQUESTED CHANGE: AEH <i>design</i> assurance level (DAL)</p> <p>JUSTIFICATION: Use of exact terminology in ED-80/DO-254.</p> </div>
response	<p>Partially accepted</p> <p>The wording ‘criticality level’ is now used consistently in AMC 20-1, 20-2 and 20-3 to replace ‘level’ (for software) and ‘design assurance level/DAL’ (for AEH).</p>

comment	<p>78</p> <p style="text-align: right;">comment by: <i>Garmin International</i></p> <p>Section 5a) Page 8: This paragraph includes the following text:</p> <p>It should be ensured that the software levels, AEH development assurance level (DAL) and safety and reliability objectives for the electronic control system are consistent with these requirements.</p> <p>The use of “software levels” and “AEH development assurance level (DAL) is inconsistent. Suggest:</p> <p>It should be ensured that the software development assurance level (DAL), AEH DAL, and safety and reliability objectives for the electronic control system are consistent with these requirements.</p> <p>Several other paragraphs are also inconsistent in their reference to software level and AEH DAL. Suggest updating these as well:</p> <ul style="list-style-type: none"> AMC 20-1A Section 5b) Bullet 1 AMC 20-1A Section 6. Table (four instances) AMC 20-2B Section 4.3 (two instances) AMC 20-2B Section 5.1 AMC 20-2B Section 5.2(a) AMC 20-2B Appendix Table (three instances)
response	<p>Partially accepted</p> <p>The wording ‘criticality level’ is now used consistently in AMC 20-1, 20-2 and 20-3 to replace ‘level’ (for software) and ‘design assurance level/DAL’ (for AEH).</p>

AMC 20-2A

p. 11-13

comment	<p>49</p> <p style="text-align: right;">comment by: <i>AIRBUS</i></p> <p>PAGE / PARAGRAPH : AMC 20-2B: Pages 11 & 12 / Paragraph 4.3</p> <p>PROPOSED TEXT / COMMENT: Airbus proposes to delete reference to ED80 (DO254) for AEH.</p> <p>RATIONALE / REASON : ED80 is recognized within this AMC 20-2 (AMC20-3) whereas it is not within AMC to 25.1309 (cf CS25 Amendment 19 - 12 May 2017). In addition, it is expected that first step will be publication of AMC 20-152 (that could be referred to within AMC to 25.1309).</p>
response	<p>Accepted</p> <p>The references to ED-80/DO-254 have been consistently replaced by a reference to the latest revision of AMC 20-152.</p>



comment	53	comment by: <i>The Boeing Company</i>
	<p>Page: 11 Section 4.3 Paragraph 1 Line 2</p> <p>THE PROPOSED TEXT STATES: AEH development assurance level (DAL)</p> <p>REQUESTED CHANGE: AEH <i>design</i> assurance level (DAL)</p> <p>JUSTIFICATION: Use of exact terminology in ED-80/DO-254.</p>	
response	<p>Partially accepted The wording 'criticality level' is now used consistently in AMC 20-1, 20-2 and 20-3 to replace 'level' (for software) and 'design assurance level/DAL' (for AEH).</p>	
comment	64	comment by: <i>Airbus Helicopters</i>
	<p>(AMC 20-2A § 4.1, page 11)</p> <p>Comment This section states about "A greater interdependence of the Engine, or Propeller, and Aircraft". However, AMC 20-2 is not related to engine or propeller, but to APU.</p> <p>Proposal "A greater interdependence of the APU and Aircraft".</p>	
response	<p>Accepted The text has been amended as suggested.</p>	
comment	65	comment by: <i>Airbus Helicopters</i>
	<p>(AMC 20-2A § 4.3, page 12)</p> <p>Comment In the sentence "It should be noted the software disciplines described in the latest edition of AMC 20-115 (or AEH in ED-80) [...]", "software" is incorrect, because AEH is also concerned.</p> <p>Proposal Remove "software" or state "software/AEH disciplines".</p>	
response	<p>Accepted The text has been amended as suggested. In addition, the reference to ED-80/DO-254 has been replaced with a reference to AMC 20-152A in answer to other comments.</p>	
comment	66	comment by: <i>Airbus Helicopters</i>

	<p>(AMC 20-2A § 5.1, page 12)</p> <p>Comment “[...] such as CS 25A901, CS 25A903 and CS 25.1309 [...]” CS 25A901 and CS 25A903 do not exist. This probably stands for CS 25.901 and CS 25.903.</p> <p>Proposal “[...] such as CS 25.901, CS 25.903 and CS 25.1309 [...]”</p>
response	<p>Accepted The text has been amended as suggested.</p>
comment	<p>79 comment by: <i>Garmin International</i></p> <p>Section 4.3, Paragraphs 2 and 3 Page 11-12: These paragraphs both reference ED-80 as an acceptable means of compliance for AEH development.</p> <p>FAA and EASA are currently working to develop and release a harmonized version of EASA AMC 20-152A / FAA AC 20-152A titled "Development Assurance in Airborne Electronic Hardware (AEH)".</p> <p>To avoid the need for a future update of this AMC, “ED-80” should be replaced with “AMC 20-152A (or later version)” and the release of NPA 2017-09 should be coordinated with the future NPA that introduces AMC 20-152A.</p>
response	<p>Accepted The references to ED-80/DO-254 have been consistently replaced by references to the latest revision of AMC 20-152.</p>
comment	<p>80 comment by: <i>Garmin International</i></p> <p>Section 4.3, Paragraph 2 Page 11-12: The paragraph states, “The APU software level and AEH DAL should be determined by the APU and Aircraft/system safety assessment process; ED-79A/ARP4754A and ARP 4761 provide guidance on how to conduct an Aircraft/APU/system safety assessment process.”</p> <p>The reference to ED-79A/ARP 4754A is not necessary, as ARP 4761 is sufficient to demonstrate an example of conducting a system safety assessment process. Further, as noted in a recent joint AeroSpace and Defence Industries Association of Europe (ASD), Aerospace Industries Association (AIA), and General Aviation Manufacturers Association (GAMA) communication with upper level EASA and FAA management:</p> <ul style="list-style-type: none"> • ED-79A/ARP 4754A identify themselves as “guidelines” not “guidance” • ED-79A/ARP 4754A section 2.2 includes the following definitions for guidance vs. guideline (emphasis added): <p>“GUIDANCE: Recommended procedure for complying with regulations.” “GUIDELINE: Supporting information that can be helpful but is not considered to be guidance.”</p>

	<p>Similarly, the title of ARP 4761 identifies it as “guidelines” rather than guidance. The word should be changed to be consistent with the title, and intent, of the referenced document.</p> <p>Suggested revision: “The APU software level and AEH DAL should be determined by the APU and Aircraft/system safety assessment process; ARP 4761 provides guidelines on how to conduct an Aircraft/APU/system safety assessment process.”</p>
response	<p>Partially accepted ‘Guidance’ has been changed to ‘guidelines’. However, the reference to ARP 4754A/ED-79A has been maintained, as it is necessary in a paragraph dealing with DAL allocation.</p>

AMC 20-3A

p. 14-23

comment	<p>50</p> <p>PAGE / PARAGRAPH : AMC 20-3B : Page 20 / Paragraph 10 (b) Page 21 / Paragraph 11</p> <p>PROPOSED TEXT / COMMENT: Airbus proposes to delete reference to ED80 (DO254) for AEH.</p> <p>RATIONALE / REASON : ED80 is recognized within this AMC 20-2 (AMC20-3) whereas it is not within AMC to 25.1309 (cf CS25 Amendment 19 - 12 May 2017). In addition, it is expected that first step will be publication of AMC 20-152 (that could be referred to within AMC to 25.1309).</p>	comment by: AIRBUS
response	<p>Accepted The references to ED-80/DO-254 have been consistently replaced by references to the latest revision of AMC 20-152.</p>	



comment 54 comment by: *The Boeing Company*

Page: 15

Paragraph: 10(c)

THE PROPOSED TEXT STATES:

Software/AEH level of software design assurance

REQUESTED CHANGE:

Software *Level* / AEH *design assurance level*

JUSTIFICATION: Use of exact terminology in ED-12C/DO-178C and ED-80/DO-254 respectively.

response Partially accepted
The wording 'criticality level' is now used consistently in AMC 20-1, 20-2 and 20-3 to replace 'level' (for software) and 'design assurance level/DAL' (for AEH).

comment 55 comment by: *The Boeing Company*

Page: 20

Paragraph: 10(c)

THE PROPOSED TEXT STATES:

Software/AEH level of software design assurance

REQUESTED CHANGE:

Software *Level* / AEH *design assurance level*

JUSTIFICATION: Use of exact terminology in ED-12C/DO-178C and ED-80/DO-254 respectively.

response Partially accepted
The wording 'criticality level' is now used consistently in AMC 20-1, 20-2 and 20-3 to replace 'level' (for software) and 'design assurance level/DAL' (for AEH).

comment 56 comment by: *The Boeing Company*

Page: 20

Paragraph: 10(c) paragraph 2 line 2

THE PROPOSED TEXT STATES:



response	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>“..software development assurance..”</p> <p>REQUESTED CHANGE: “..software <i>design</i> assurance..”</p> <p>JUSTIFICATION: Consistent use of terminology.</p> </div> <p>Partially accepted The subject paragraph has now been deleted.</p>
comment	<p style="text-align: right;">comment by: <i>The Boeing Company</i></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Page: 23 Paragraph: 1, line 2</p> <p>THE PROPOSED TEXT STATES: “..software/AEH quality assurance..”</p> <p>REQUESTED CHANGE: “..software <i>quality</i> / AEH <i>process</i> assurance..”</p> <p>JUSTIFICATION: Use of exact terminology in ED-12C/DO-178C and ED-80/DO-254 respectively.</p> </div> <p>Partially accepted Although the proposed change would be adequate, it is considered that in this context, it would be better to change the word ‘quality’ to ‘development’. Indeed, this sentence is meant to cover the software and AEH development assurance processes in a wider sense, not only the quality or process assurance aspects.</p>
comment	<p style="text-align: right;">comment by: <i>The Boeing Company</i></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Page: 23 Example B, Paragraph 1, line 1</p> <p>THE PROPOSED TEXT STATES: “..software/AEH quality assurance..”</p> <p>REQUESTED CHANGE: “..software <i>quality</i> / AEH <i>process</i> assurance..”</p> <p>JUSTIFICATION: Use of exact terminology in ED-12C/DO-178C and ED-80/DO-254 respectively.</p> </div>

response

Partially accepted

Although the proposed change would be adequate, it is considered that in this context, it would be better to change the word 'quality' to 'development'. Indeed, this sentence is meant to cover the software and AEH development assurance processes in a wider sense, not only the quality or process assurance aspects.

comment

68

comment by: Airbus Helicopters

(AMC 20-3A § (10)(c), page 20)

Comment

The title ("*Software/AEH Level of software design assurance*") is incorrect.

Proposal

"Software/AEH design assurance level"

response

Partially accepted

The wording 'criticality level' is now used consistently in AMC 20-1, 20-2 and 20-3 to replace 'level' (for software) and 'design assurance level/DAL' (for AEH).

comment

69

comment by: Airbus Helicopters

(AMC 20-3A § (10)(c), page 20)

This shall be considered as a major comment**Comment**

The 2 first paragraphs of this section provide indications about expected design assurance levels for the engine control system:

- *"[...] implementation and verification of the software in accordance with Level A [...] is normally needed to achieve the certification objectives for aircraft to be type certificated under CS-25, CS-27-Category A and CS-29-Category A"*
- *"in the case of a piston engine in a single-engine aircraft, level C [...] software has been found to be acceptable"*

Providing some "hard coded" DAL might be misleading and lead to inadequate DAL allocations.

The third paragraph duly indicates that DALs have to be determined by the engine safety assessment process.

Proposal

Remove the first and second paragraph of section (10)(c).

NOTE: This issue had been partly addressed during the consultation on NPA 2012-11.

response

Accepted

The two first paragraphs of Section 10.c have been deleted as suggested.



comment	<p>81 comment by: <i>Garmin International</i></p> <p>Section 10 (b) Page 20: In multiple locations, the paragraph references ED-80 as an acceptable means of compliance for AEH development.</p> <p>FAA and EASA are currently working to develop and release a harmonized version of EASA AMC 20-152A / FAA AC 20-152A titled "Development Assurance in Airborne Electronic Hardware (AEH)".</p> <p>To avoid the need for a future update of this AMC, "ED-80" should be replaced with "AMC 20-152A (or later version)" and the release of NPA 2017-09 should be coordinated with the future NPA that introduces AMC 20-152A.</p>
response	<p>Accepted</p> <p>The references to ED-80/DO-254 have been consistently replaced by references to the latest revision of AMC 20-152.</p>
comment	<p>82 comment by: <i>Garmin International</i></p> <p>Section 10 (c) Paragraph 5: This paragraph is confusing in its update to include AEH. The other sections and paragraphs equate software and AEH, while this section appears focused on software partitioning without allowing AEH partitioning. The addition of the text "including appropriate AEH levels" is unclear in the context of the sentence to which it is added. Suggest making updates to this paragraph similar to others, where "software" becomes "software/AEH."</p>
response	<p>Partially accepted</p> <p>Your comment is correct. While rewording the paragraph, it was noticed that it does not bring in any additional guidance compared with the existing text. Moreover, such considerations are not present in AMC 20-1A or AMC 20-2B.</p> <p>Therefore, the subject paragraph has been deleted from the proposed AMC 20-3B.</p>
comment	<p>83 comment by: <i>Garmin International</i></p> <p>Section 11 Paragraphs 2 and 3: Paragraphs 2 and 3 present guidance that will be contained in the upcoming EASA AMC 20-152A.</p> <p>FAA and EASA are currently working to develop and release a harmonized version of EASA AMC 20-152A / FAA AC 20-152A titled "Development Assurance in Airborne Electronic Hardware (AEH)".</p> <p>Paragraphs 2 and 3 of this section should be replaced with: "AMC 20-152A (or later version) is an acceptable means, but not the only means, for showing compliance with CS-E 50 (f)." and the release of NPA 2017-09 should be coordinated with the future NPA that introduces AMC 20-152A.</p>
response	<p>Accepted</p> <p>The text has been amended as proposed.</p>

New AMC 20-19

p. 24-45

comment

2

comment by: *Lufthansa Technik AG***6.1.1 (d)**LHT suggests to extent the electrical specification for **power** outlets:

Units with capability of power supply with:

- voltage higher than or equal to 42 V; or
- power higher than **15 W**; or
- current higher than **3 A**

should be treated as **power** outlets.

Many USB Battery Charging (USB-BC) solutions, available from aircraft industry suppliers, provide slightly higher output power (e.g. 5 V DC and **2.1 A** per USB port Type A). Furthermore USB Type-C specifies up to 3A (max. 15 W) output power at 5 V DC nominal supply voltage. These types of **charging** outlets should not be considered as **power** outlets.

response

Accepted

The wording in the AMC has been changed accordingly.

comment

4

comment by: *LHT DO*

LHT does appreciate the activity to establish AMC 20-19 very much.

Please find attached our comments based on our CAMO as well as DOA experience.

General:

- Various referenced documents have been updated in between (e.g. ED-130 has been replaced by ED-130A). LHT suggests to update the list or to add a note, that the later revisions of the documents is applicable.
- LHT proposes to integrate the contents of the CRI 'Network security' or 'Security protection of aircraft systems and networks' which have been raised on former projects.

4(g)

This example should be deleted as the aspects of power supplies outlets have been covered already by CM-ES-001. –

5(a)

Performance capability might be misunderstood in respect to 'no credit should be given'. LHT proposes to use 'no credit should be given to its safety performance capability'

5(i)

'Section 0 below' is mentioned, but no reference available.

6.1.1(d)

This item defines the max. power which could be supplied for connected units as long as the outlets should not be defined as power outlets. Since various units are connected e.g. via the LAN standard IEEE 802.3af or later for PoE, the values defined in this standard would exceed the mentioned limits.



LHT suggest to increase the values for voltage and power accordingly.

6.1.2(g)

This item does not reflect the CS25 Amdt. 19 where the requirements for glass panels like glass displays have been included.

LHT suggest to adapt this item to include the requirements of CS25.0788(b) Amdt. 19.

6.2.3.2(b)

EASA defines, that „Tests/demonstrations should take into account critical configurations of use of the IFE system, including critical configurations of passengers’ portable electrical or electronic devices connected to the IFE System.“ Due to the nature of IFE systems there are no critical effects to the aircraft as identified in SSA performed for the installation. The IFE system including the downlink portion of the installation is therefore deemed to tested adequately in the normal configuration. The critical configuration of the PEDs has to be analysed within the PED tolerance exercise performed according to CM-ES-003.

LHT suggest to replace "critical configuration" by "typical configuration" and add reference or integrate the related passages of CM-ES-003.

6.2.3.2(c)

Interference are also possible during normal flight phases but maybe are not so critical. Consequently sufficient compliance demonstration acc. Section 21 should be performed for all flight phases.

6.2.4

EASA defines, that “If high- or low-voltage power outlets are available for passenger use, the aspects related to the use of PSSs for PEDs should be considered.” If power outlets acc. item 6.1.1(d) are part of the installation, this aspect should be considered during the compliance finding with CM-ES-001. Power outlets should not be part of this guidance material.

6.3(a)

Would security updates in general, e.g. patches, bugfixes, virus protection updates etc. for the core SW be considered to become ICA and/or will the current network security CRI cover these items for each project?

6.3(d)

EASA defines, that for devices, including wireless capabilities, connected "with other aircraft equipment and/or passenger or crew transmitting portable electronic devices (T-PEDs) ... electromagnetic compatibility with the intentional emissions of the IFE system“ should be considered.

Interference resulting from connections with other fixed installed aircraft equipment should be part of the corresponding EMI tests/demonstrations. Operation of T-PEDs have to be analysed within the PED tolerance exercise performed according to CM-ES-003 (see also section 6.2.3.2(b)).

LHT suggest to reference or integrate the related passages of CM-ES-003 for T-PED compliance.

6.4.1



	<p>The definition of CORE and CONTENT SW seems not yet fully sufficient. It is required for certification as well as to enable operators to change the content. The kind of SW has to be clearly visible to all interested parties for each project.</p> <p>Please note that a segregation between core and content is not yet considered in DO178C.</p> <ul style="list-style-type: none"> • Please verify that only core software configuration has to be actively controlled by the operator / CAMO. • Please confirm that the content data can be loaded by anyone who has been familiarized with the system and does not need to be controlled by the operator / CAMO on the aircraft level. <p>6.5.5(d) Power outlets are not originally the intent of this AMC and are considered in CM-ES-001. Current protection features are a basic protection feature to avoid fire, fumes and smoke. But it is not coercible necessarily for power supplies to observe the output. LHT suggest the following wording: “In addition, power supplies should have current-limiting protection at a suitable level (e.g. seat equipment).”</p>
response	<p>4 general bullet 1 — Partially accepted</p> <p>The following text has been added:</p> <p>‘The documents listed below are standards and guidance up to date. Later or previous amendments may apply depending on the retained certification basis.’</p> <p>4 general bullet 2 — Partially accepted The result of RMT.0648 is considered in the AMC.</p> <p>4(g) — Accepted Power supplies are explicitly excluded from AMC 20-19. 4(g) has been deleted.</p> <p>5(a) — Accepted EASA considers that the requirement is clear enough.</p> <p>5(i) — Accepted The reference has been updated with the correct number (6.5.1). ‘This is addressed in Section 6.5.1 below.’</p> <p>6.1.1(d) — Accepted Refer to the previous comment #2.</p> <p>6.1.2(g) — Accepted The text has been modified as follows: ‘Glass surfaces may be part of the IFE system components, e.g. in display units. The potential hazard for the occupants in case of breakage of large sheets of glass should be considered. The approach that the applicant should follow should be agreed with EASA based on requirement CS 25.788(b). Compliance with CS.25.365(g) should also be considered.’</p> <p>6.2.3.2(b) — Not accepted</p>

The intention is to perform the test in a worst-case scenario such as a loss of the on-board system that controls the emissions, and having all PEDs transmitting at their highest power to connect to ground stations.

6.2.3.2(c) — Accepted

The intention of this paragraph is to bring attention to the cases in which an IFE system is expected to be used during critical phases of flight.

In Section 6.5.1, Section 21 is recommended to be performed in any case — we have deleted the reference to Section 21 from paragraph 6.2.3.2(c) to avoid any confusion. The paragraph will read as follows:

‘If the whole IFE system or parts of it are to be active during critical flight phases (take-off and landing), particular attention should be paid to the demonstration of non-interference during these flight phases.’

6.2.4 — Not accepted

EASA prefers to keep it for completeness.

6.3(a) — Not accepted

Network security is not part of this AMC.

6.3(d) — Not accepted

CMs cannot be referenced in AMCs.

6.4.1 — Not accepted

EASA confirms that in this AMC, only the core software belongs to the aircraft configuration. As such, it needs to be configuration-controlled by the aircraft manufacturer. It is, however, unclear what the commentator means by ‘actively controlled’ by the operator.

Regarding the content data, we confirm that it is not part of the aircraft configuration and that it should be managed under the responsibility of the operator, per the provisions of the applicable operational rules. It is not the purpose of this AMC to detail the operational aspects, but typically operators do have some configuration control in place for the content data of an IFE system.

Therefore, we consider that the current text is sufficient.

6.5.5(d) — Accepted

EASA accepts the proposal and the text has been modified accordingly.

comment 30 comment by: PMVE

(c) Very often seats electrical/IFE equipment are listed as part of the seats DDP/ETSO.

response Not accepted
The comment is not clear. Nevertheless, it is assumed that the intent of the comment is that the text should be changed. EASA considers the text clear enough with the following explanation. The purely ‘electrical/electronic’ aspects (including but not limited to software/AEH, EM compatibility and interference, environmental, etc.) are outside the scope of the ETSO and are certified at the aircraft level.



comment	32	comment by: <i>PMVE</i>
	(i) "This is addressed in Section <u>0</u> below.": incorrect reference provided.	
response	Accepted The reference has been updated with the correct number (6.5.1). 'This is addressed in Section 6.5.1 below.'	
comment	33	comment by: <i>PMVE</i>
	(g) Criterias for determination of large surface to be clarified (e.g. applicability of Large Screen CRI).	
response	Partially accepted A direct reference to the CRI has not been provided, since this may change with time. Nevertheless, the applicable requirement has been added in order to provide a clearer framework for the topic. This is also linked to comment #4.	
comment	35	comment by: <i>PMVE</i>
	(f) Provide reference to the Lithium Special Condition and associated Certification Memos.	
response	Not accepted Lithium battery SCs are generic for any kind of installation and are not IFE specific. There is no CM on Li batteries.	
comment	36	comment by: <i>PMVE</i>
	(b) Use of passenger PED during all flight phases requires specific demonstration in accordance with ED130A (BackDoor/FrontDoor coupling demonstration).	
response	Not accepted The PED tolerance assessment is not addressed in AMC 20-19, but by additional material.	
comment	37	comment by: <i>PMVE</i>
	6.2.4. Provide reference to the associated Certification Memo.	
response	Accepted	
comment	39	comment by: <i>PMVE</i>
	6.3 (d) Provide reference to the Certification memo concerning PED tolerance demonstration.	
response	Accepted	
comment	40	comment by: <i>PMVE</i>
	6.5.3. Not obvious when these tests shall not be considered.	
response	Noted	

AMC 20-19 gives generic guidelines. A certification approach and corresponding means of compliance should be proposed by the applicant and agreed on a case-by-case basis, depending on the installation.

comment

59

comment by: *The Boeing Company*

Page: 24

Table of Contents entry: 6.4.2

The proposed text states:

6.4.2 Software development assurance

REQUESTED CHANGE:6.4.2 Software *design* assurance**JUSTIFICATION:** Consistent use of terminology.

response

Not accepted

The term 'development assurance' is actually used in AMC 20-115().

comment

60

comment by: *The Boeing Company*

Page: 38

Title of Section 6.4.2

The proposed text states:

6.4.2 Software development assurance

REQUESTED CHANGE:6.4.2 Software *design* assurance**JUSTIFICATION:** Consistent use of terminology.

response

Not accepted

The term 'development assurance' is actually used in AMC 20-115().

comment

70

comment by: *Airbus Helicopters*

(AMC 20-19 § 6.7, page 42)

This shall be considered as a major comment**Comment**

According to our knowledge, "General Aviation aircraft" is not defined today in the European regulatory system.

Consequently, the scope of section 6.7 is ambiguous.



	<p>Proposal Clarify the scope of this section, using official wording.</p> <p><u>NOTE:</u> According to our understanding, “General Aviation aircraft” designates other than complex aircraft used in non-commercial operations. If this is the correct view, there might be a need to precise that, in case the alleviated process proposed in section 6.7 has been used, the aircraft flight manual or flight manual supplement should specify that the IFE system is not intended for use in Commercial Air Transport.</p>
response	<p>Accepted EASA agrees that the meaning of General Aviation Aircraft should be better clarified in the framework of this NPA. The following text has been added in Chapter 5: ‘For the purpose of this AMC, “general aviation aircraft” are those aircraft that comply with the CS-23 specifications.’</p>

comment	<p>71 comment by: <i>Airbus Helicopters</i></p> <p>(AMC 20-19 § 8, page 45) This shall be considered as a major comment</p> <p>Comment Apparently, section 8 is a tentative to point-out paragraphs of the operational regulation which are relevant to operators in case an IFE system is operated on board, although there is currently no explicit reference to IFE systems in those paragraphs. However, pure operational considerations have nothing to do in an AMC 20 and will likely be unknown by operators, and will consequently have no effect. Also notice that it was one of the objectives of RMT.0561 to separate airworthiness provisions from operational criteria (see ToR RMT.0561 issue 3 § 1.2).</p> <p>Proposal Remove section 8.</p> <p>If deemed necessary, an amendment of regulation (EU) No 965/2012 and/or associated AMC/GM should be envisaged.</p>
response	<p>Partially accepted Section 8 has been amended for clarification.</p>

comment	<p>87 comment by: <i>IATA</i></p> <p>“6.6 Commercial off-the-shelf (COTS) equipment” Suggested (re)wording and introduction of the word ‘risk’ where refers to (§8): “Firstly, the installer should perform a safety risk assessment of the potential hazards associated with the installation of the COTS equipment, “</p>
response	<p>Accepted ‘The installer should perform a safety risk assessment of the potential hazards associated with the installation of the COTS equipment.’</p>

comment	<p>89 comment by: <i>Airbus</i></p>
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Page 34, paragraph 6.2.1, Power supplies:

We propose to change the first sentence as follows:

"The IFE equipment should be powered by a ~~non-essential power supply (busbar)~~ of the aircraft, i.e. an electrical busbar that does not supply power to aircraft systems necessary for continued safe flight and landing."

Reason:

The current text might lead to a confusion between the terms "Essential" and "continued safe flight and landing".

The first term relates to "essential systems", defined in paragraph 25.1310 and the second term relates to the emergency operation.

response

Accepted

The text has been modified as proposed:

'The IFE equipment should be powered by an electrical bus bar that does not supply power to the aircraft systems necessary for continued safe flight and landing.'

3.2.2. AMC/GM to Part-ORO — AMC1 to ORO.GEN.110(f)(h)

p. 62-63

comment

88

comment by: IATA

IATA Comments: item (3) - the procedures regarding IFE shall be the ones related to safety. These shall be documented depending on the Operators documentation system: OM Part B, CCOM, FAM, SEP etc.

response

Accepted

The purpose of the AIR OPS Regulation is to regulate aviation safety, therefore all the amendments on IFE are considered to be those related to safety, not cabin services. However, to avoid potential misinterpretations, as suggested in the comment, the amendments on IFE have been clarified to clearly state that they relate to safety aspects.

The cabin crew operations manual and SEP procedures form a part of the operator's operations manual. Please refer to ORO.MLR.100.

AMC1 ORO.CC.125(c)

p. 64-65

comment

85

comment by: IATA

IATA Comment - AMC1 ORO.CC.125(c) - (b) (5)

We would suggest the adjustment that training is applicable for only areas with safety implications (i.e. Use of IFE for safety briefing and IFE fire fighting procedures) and additional training is only required when the current system is new to the Cabin Crew.

response

Noted

The amendment of AMC1 ORO.CC.125(c) has been deleted, as this was a typo. IFE is not an aircraft-type-specific system.

AMC1 ORO.CC.125(d)

p. 66

comment

86

comment by: IATA



	<p>IATA Comment: AMC1 ORO.CC.125(d) (a) (11) IFE We suggest that training is applicable for only areas with safety implications (i.e. Use of IFE for safety briefing and IFE fire fighting procedures) and additional training is only required when the current system is new to the Cabin Crew.</p>
<p>response</p>	<p>Accepted AMC1 ORO.CC.125(d) covers elements pertinent to the operator’s cabin configuration. It is assumed that the operator’s <i>aircraft type training</i> concentrates on elements as described in the comment, and that any aspects related to cabin services are addressed by the operator as per the operator’s internal processes on cabin services. To avoid any misinterpretations, point (11) has been amended, and now mentions the safety aspects of the IFE system to be covered by this type of training. Each cabin crew member must comply with the provisions of the AIR OPS Regulation.</p>

7. Appendix	p. 75
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<p>comment</p>	<p><i>1</i> comment by: <i>LBA B2</i></p>
	<p>No Objections</p>
<p>response</p>	<p>Noted</p>

