



## Appendix to ED Decision 2018/008/R

RELATED NPA: 2017-11 — RMT.0456 (RMT.0621, RMT.0622) — 27.8.2018

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## 1. Summary of the outcome of the consultation

135 unique comments were received from 19 stakeholders. The following Table 1 shows the number of comments received by each commentator:

<b>Commentators</b>	<b># of comments</b>
Aero-Club of Switzerland	1
AIRBUS	2
Airbus Helicopters	3
ASD - AeroSpace and Defence Industries Association of Europe	32
AVIAGE SYSTEMS	10
CAA-NL	5
Dassault-Aviation	1
DGAC France	1
Embraer S.A.	9
EUROCONTROL	1
FAA	10
Garmin International	2
GE Aviation	8
General Aviation Manufacturers Association (GAMA)	31
Luftfahrt-Bundesamt	1
Prof. Filippo Tomasello	1
René Meier, Europe Air Sports	2
The Boeing Company	11
UK CAA	4

*Total: 135*

**Table 1**



The subjects that received the highest number of comments are listed in the following Table 2:

NPA 2017-11 Segment	Title of the segment	# of comments
7	Proposed ETSO-2C516	42
14	Proposed AMC-20-170 point 5. 'Additional recommendations for IMA system certification'	16
12	Proposed AMC-20-170 point 3. 'Policy for IMA system certification'	14
13	Proposed AMC-20-170 point 4. 'Incremental Certification Process'	13
n/a	General comments	12
5	CS-ETSO — SUBPART A — GENERAL	11
8	ETSO-2C516 — Appendix 1	6
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4	CS-ETSO	5
2	In summary — why and what — 2.2. objectives	3
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1	About this NPA	1
3	Overview of the proposals — 2.3.1. Proposed amendments to CS-ETSO	1
6	SUBPART B — LIST OF ETSOs (INDEX 1 AND INDEX 2)	1
9	AMC-20-170 — ToC	1
15	Impact assessment (IA)	1
16	Proposed actions to support implementation	1

**Table 2**

The commentators were in general supportive of the proposed amendments to CS-ETSO.

The nature of the comments received ranged from specific technical comments to observations aimed at improving the wording. The majority of these comments have been accepted and the wording proposed by NPA 2017-11 has been improved accordingly.



The majority of the comments submitted were either accepted or partially accepted, as shown in the following Table 3:

	ACCEPTED	PARTIALLY ACCEPTED	NOTED	NOT ACCEPTED	Σ
# of comments	36	31	39	39	145 (*)
percentage	25 %	21 %	27 %	27 %	100

Table 3

(\*) *Some comments were allocated to the wrong section by the commentators, while some other comments contained positions and opinions that related to different subjects. Therefore, to improve the readability and management of stakeholder’s feedback, EASA reallocated these comments to the appropriate sections and split some others.*

*In no case has the text of a received comment been amended by EASA.*

The individual comments and the responses to them are contained in Chapter 2 of this Comment-Response Document (CRD).

A summary of the main changes made compared with the text proposed in NPA 2017-11 is provided in the Explanatory Note to the Decision on ‘CS-ETSO — Amendment 14’.

**Important note:**

After the NPA 2017-11 consultation, the proposed ETSO-2C516 has been renamed to ‘ETSO-C214’ since the FAA agreed to introduce an equivalent TSO into their system.

However, in the CRD, the initial reference (ETSO-2C516) has been kept since the text of submitted comments cannot be changed.



## 2. Individual comments and responses

In responding to comments, a standard terminology has been applied to attest EASA’s position. This terminology is as follows:

- (a) **Accepted** — EASA agrees with the comment and any proposed amendment is wholly transferred to the revised text.
- (b) **Partially accepted** — EASA either agrees partially 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 necessary.
- (d) **Not accepted** — The comment or proposed amendment is not shared by EASA.

<b>(General Comments)</b>	-
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comment	1		comment by: <i>Aero-Club of Switzerland</i>
		We thank the Agency for the preparation.	
response		Noted.	

comment	4		comment by: <i>René Meier, Europe Air Sports</i>
		blabla	
response		Noted.	

comment	6		comment by: <i>Prof. Filippo Tomasello</i>
		This proposal, of introducing an intermediate step in the certification process, between 'equipment level' and 'product level' is very good and modern. Congratulations. Please go ahead.	
response		Noted.	

comment	7		comment by: <i>FAA</i>
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Kirk Baker	General	This proposed standard is subjective and process driven with no minimum technical performance standards identified. Therefore, it is difficult to determine the success criteria for several of the objectives without extensive evaluation and subjective assessment of a process.
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response

Not accepted.

The ETSO-2C516 standard is related to the process to use and integrate an ETSO-2C153 platform. The standard describes the objectives of the process when applying for a functional ETSO using a previously approved ETSO-2C153 platform. As requested in Subpart A Section 2.5, the applicant shall apply for authorisation to the ETSO-2C516 standard, together with the intended functional ETSO standard. The functional ETSO standard obviously contains functional requirements that should be met following a particular development process whose objectives are described in the ETSO-2C516 standard.

EASA considers that developing a function using an ETSO-2C153 IMA platform demands particular and adapted processes.

A large number of requirements described in ETSO-2C516 refer to ED-124, but also to ED-12C and ED-80. EASA does not consider that compliance with these industry standards is 'subjective'. EASA agrees that developing a function using an approved ETSO-2C153 platform demands assessment of the process used.

comment

26 comment by: *DGAC France*

Please note that DGAC France has no specific comments on this NPA.

response

Noted.

comment

27 comment by: *Luftfahrt-Bundesamt*

LBA has no comments on NPA 2017-11.

response

Noted.

comment

99 comment by: *AIRBUS*

As a member of the ASD, Airbus has participated to the different meetings on RMT.0456.

Consequently, Airbus fully supports the comments provided by ASD on this NPA.



response

Noted.

comment

116

comment by: *Airbus Helicopters*

Airbus Helicopters thanks EASA for providing the opportunity to comment on NPA 2017-11.

You will find below a general comment, which does not impact the current text proposals.

**Comment**

ETSO-2C516 describes how an ETSOA can be granted to an article (equipment) using ETSO-2C153 authorised IMA platform(s)/module(s).

This will fill the previous gap with FAA AC 20-170 section 8.3. (Functional TSO Authorization).

However, considering IMA as a means to combine resource modules and functional modules into complete systems fitted to each aircraft, there would be a need to consider granting credits to software modules:

- Either through an ETSOA, when the software module implements a standard ETSO function,
- Or, if not, through another form to be defined.

This would, of course, cover neither the integration of the IMA system nor its validation in the context of the product (aircraft), but allow an incremental approach in the frame of a “product” policy.

**Proposal**

Airbus Helicopters encourages EASA to think about such a modular incremental approach.

response

Noted.

EASA is not sure that we understand the comment. We hope that the following may provide an answer.

The ETSO-2C516 standard proposes an incremental step in the approval process, and allows a software function integrated on a given ETSO-2C153 platform/module to be approved. It is understood by the stakeholders that a software function without its hardware resource does not comply by itself with the functional ETSO standards.

comment

151

comment by: *ASD - AeroSpace and Defence Industries Association of Europe*

General comment on NPA 2017-11

ASD is pleased to comment the NPA 2017-11 about Integrated Modular Avionics.

This phase 2 of the rulemaking task about IMA will complete the European IMA framework initiated with the ETSO 2C153 publication in 2016. For this reason, ASD considers that the proposed texts globally answer to the ToR. Few major comments are



	<p>provided.</p> <p>This NPA also closes more than 5 years of rulemaking on IMA with an efficient and intense collaboration between EASA and industry.</p> <p>So, now, this framework (ETSO 2C153, 2C516 and AMC 20-170) will give the opportunity to both industry and EASA to streamline certification projects of EU products and articles embedding IMA technologies.</p>
response	Noted.

comment	<p>152 <span style="float: right;">comment by: <i>Airbus Helicopters</i></span></p> <p>Please be informed that Airbus Helicopters fully supports the comments posted by ASD (AeroSpace and Defence Industries Association of Europe).</p>
response	Noted.

comment	<p>155 <span style="float: right;">comment by: <i>EUROCONTROL</i></span></p> <p>The EUROCONTROL Agency welcomes the publication of EASA Notice of Proposed Amendment 2017-11. It also thanks EASA for the opportunity that has been given to submit comments on this NPA. The EUROCONTROL Agency, however, has no comment to make.</p>
response	Noted.

comment	<p>156 <span style="float: right;">comment by: <i>Dassault-Aviation</i></span></p> <p>Dassault-Aviation supports the ASD comments</p>
response	Noted.

<b>1. About this NPA</b>	p. 4
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comment	<p>5 <span style="float: right;">comment by: <i>René Meier, Europe Air Sports</i></span></p>
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response	juhui
	Noted.

**2. In summary — why and what - 2.2. objectives** p. 6

**2.3. Overview of the proposals - 2.3.1. proposed amendments to CS-ETSO** p. 6-7

comment	15	comment by: FAA			
	<table border="1"> <tr> <td>Brett</td> <td>Summary Section 2.1 Third Bullet</td> <td>The statement “whereas IMA platforms are composed of modules which are designed to be reusable on several aircraft types and <u>independent of the aircraft</u>” is not correct. The design specifics must meet the aircraft level safety requirements. Suggest changing to “whereas IMA platforms are composed of modules which are designed to be reusable and compatible with the requirements of several aircraft types”</td> </tr> </table>	Brett	Summary Section 2.1 Third Bullet	The statement “whereas IMA platforms are composed of modules which are designed to be reusable on several aircraft types and <u>independent of the aircraft</u> ” is not correct. The design specifics must meet the aircraft level safety requirements. Suggest changing to “whereas IMA platforms are composed of modules which are designed to be reusable and compatible with the requirements of several aircraft types”	
Brett	Summary Section 2.1 Third Bullet	The statement “whereas IMA platforms are composed of modules which are designed to be reusable on several aircraft types and <u>independent of the aircraft</u> ” is not correct. The design specifics must meet the aircraft level safety requirements. Suggest changing to “whereas IMA platforms are composed of modules which are designed to be reusable and compatible with the requirements of several aircraft types”			
response	<p>Partially accepted.</p> <p>The text mentioned is not part of the published material.</p> <p>The sentence will be adapted for the final publication as follows:</p> <p>‘whereas IMA platforms are composed of modules which <del>are</del> may be designed to be reusable on several aircraft types and <u>independent of the aircraft</u>’</p>				

comment	15	comment by: FAA			
	<table border="1"> <tr> <td>Judy</td> <td>Summary Section 2.3.1</td> <td>Open and Closed class on page 7 of 50 should be more clearly defined. For example, for open class, what types of “performance” parameters are required to be described and to what level?</td> </tr> </table>	Judy	Summary Section 2.3.1	Open and Closed class on page 7 of 50 should be more clearly defined. For example, for open class, what types of “performance” parameters are required to be described and to what level?	
Judy	Summary Section 2.3.1	Open and Closed class on page 7 of 50 should be more clearly defined. For example, for open class, what types of “performance” parameters are required to be described and to what level?			
response	<p>Noted.</p> <p>This text is not part of the published material.</p> <p>The definitions of ‘open’ and ‘closed’ classes are provided within the ETSO standard, and</p>				



not in the summary.

comment

15

comment by: FAA

Brett	Summary Section 2.3.1	Regarding open class, it is assumed the third party would need to apply for another 2C516 TSO per CFR 21.611 to make modifications to the previously TSO’s article. In that case, the TSO data package would need to consider the previous TSO holders data to be a complete package. An “incremental” data package would not stand on it’s own to meet Part 21 regulations. Please clarify the open class TSO data requirements.
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response

Not accepted.

This text is not part of the published material.

The ETSO-2C516 data package that has to be provided corresponds to the data that demonstrates compliance with these ETSO-2C516 requirements associated with the functional ETSO requirements. So, there is no requirement to re-demonstrate compliance of an item that falls under another third-party-authorized ETSO-2C153 article or ETSO-class 2C516 ‘open’ class article. This ETSOA does not consist of reauthorising the ETSO-2C153 platform used or any previously developed approved functions, but focuses on the compliant usage of those already authorised functions/platforms/modules. EASA does not see an issue of compliance with Part 21, as long as the applicant complies with the requirements of its ETSO standards.

comment

15

comment by: FAA

Brett	Summary section 2.3.1	The statement “The proposed ETSO-2C516 is an incremental step between ETSO-2C153 and the complete IMA systems certification <u>during aircraft type certification</u> ” acknowledges that the ETSO-2C516 is really tied to the aircraft type certification process which conflicts with section 2.1, third bullet, and reinforces the concept of a parallel concurrent type certification.
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response

Partially accepted.

The text is not part of the published material. The word ‘during’ is misleading and this part is deleted.

comment

15

comment by: FAA

Brett	Summary Section 2.1	Second paragraph should specify “it is not permissible to mix DO-160 versions within a given qualification program unless a deviation to ETSO is applied for and approved”. Reason: Some older versions of DO-160 for some tests are in fact more conservative and should be allowed, as requested.
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response

Partially accepted.

The text is part of Subpart A, 2.1. The sentence has been reworded.

See the answer to comment #48.

comment

47

comment by: General Aviation Manufacturers Association

Reference: "future evolution of the equipment are defined, and that the performance of the remaining resources has been characterised".

This statement implies a very “static” integration of the system that is only evolved in an additive fashion. Depending on the changes or re-application of the IMA system, the hosted applications may be reallocated to different IMA modules.

We request you consider how re-allocation of applications would be addressed regarding remaining resources.

response

Partially accepted.

In general, reallocations have to be evaluated on a case-by-case basis.

In the context of this ETSO, the applications are considered to be integrated in a given



platform framework.  
 The extent of reallocations can be very different, and the corresponding effort in reinvestigation may be substantial enough to justify a major change to the ETSO article. For instance, reallocation of the hosted application to different IMA modules would be typically considered as a major change to the ETSO article according to Part 21, point 21.A.611.  
 For 'open' class platforms, the Appendix of ETSO-2C516 has been updated to clarify the need to document the instructions regarding the means of configuration of ETSO articles.

**3. Proposed amendments - 3.1. CS-ETSO** p. 8

comment **11** comment by: FAA

Kirk Baker	3.1.1. (e) The applicant shall demonstrate the proper use of the ETSO-2C153 platform(s)/module(s)	There is no description of the method of demonstration i.e. Test and/or Analysis. One could envision a fairly complete level of integration testing would be required to demonstrate proper use.
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response Not accepted.

In the ETSO text, right after the sentence referred to by the commentator, the need to comply with the ETSO-2C153 platform/user requirements is explained. This is mandatory life cycle data that is required in ETSO-2C153. One word has been added to ensure there is no possible confusion with the integration of the full integrated ETSO-2C516 article.

The method of demonstration is dependent on the nature of each ETSO-2C153 user requirement. A more constraining method is not meaningful in this context and would be prescriptive.

comment **48** comment by: General Aviation Manufacturers Association

Reference: "It is not permissible to mix versions within a given qualification programme"

Since ETSO-2C153 module qualification may take place long before the entire IMA system is qualified, these would be considered different qualification programmes.

Modules or hardware which undergo partial qualification for the TSO 2C153 which at some later point are integrated into an IMA system which is qualified under a different programme to a later/different DO-160 revision should not invalidate the previous TSO 2C153 qualification.



response	<p>Clarification of "within a given qualification programme" is needed.</p> <p>Accepted.</p> <p>It is to be noted that this sentence is generic in Subpart A and does not come from the context of an ETSO on IMA. The sentence has been revised, but the idea is still not to mix revisions of DO-160 for an ETSO article.</p> <p>We see different scenarios:</p> <p>If a platform has been fully qualified against one revision, then the functional ETSO should select that same ED-14/DO-160 revision.</p> <p>If only an ETSO-2C153 module is used in an integrated platform that is the ETSO-2C516 article, then there is still a need to assess the previous demonstration with regard to the chosen revision of the ETSO-2C516 article. This is similar to other ETSOs when reusing a board for a new ETSO article.</p>
comment	<p>63 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO - General</p> <p>Will post F-ETSO authorization evolution of the Open Class system require re-applying for F-TSO 2C516 by the entity making the change(s)?</p> <p>Will it be possible for someone other than the F-TSO holder to make changes?</p> <p>Please clarify what is expected.</p>
response	<p>Noted.</p> <p>First question: It depends on the change, as for any other ETSO: there can be minor changes and major changes. Minor changes, if anticipated within the PN per Part 21, may be performed without an application to the authority. Major changes require an ETSO application. The addition of a new function is expected to be a major change.</p> <p>Second question: Yes, but not for just any case. It has to be an ETSO-2C516 'open' class platform, and the change should not affect the approved ETSO function; however, the applicant should respect the ETSO installation manual and the installation requirements. Changes made by an applicant other than the F-ETSO holder are not considered to be approved under the already granted ETSOA.</p> <p>See also the response to comment #64.</p>
comment	<p>64 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO - General</p> <p>There are various post F-ETSO scenarios which should be considered and explained.</p> <p>FTSO Minor changes by the original 2C516 Holder. It's assumed these would be handled</p>



identical to other Minor ETSO equipment.

Addition of a new F-ETSO function/application by someone other than the original 2C516 Holder.

Addition of a new non-ETSO application by someone other than the original 2C516 Holder.

How does “incremental credit” of an independent Application get factored into post F-ETSO evolutions?

Please clarify how these situations will be handled. Also, can the F-TSO applicant be some other than the installer?

response

Noted.

The first bullet is correct and is covered by the definition.

Second bullet: Adding a function is a new F-ETSO, and is covered through the definition of the ‘open’ class and its associated requirements.

Third bullet: This is not part of ETSO-2C516, as it is not a functional ETSO request: this is to be done through aircraft installation. We have the same limit as in traditional ETSO. You need at least one functional ETSO function to perform an incremental evolution on an ETSO-2C516 authorised article.

First question: Credit is defined on the perimeter of the F-ETSO article, as for traditional ETSOs. For installation, see AMC 20-170.

Second question: The F-TSO applicant can be an applicant other than the installer.

**3. Proposed amendments - 3.1. CS-ETSO - SUBPART A-GENERAL** p. 8-11

comment

13 comment by: FAA

Kirk Baker	3.1.1.2.3 Health Monitoring and fault management	Should include statement in this section of its applicability to non-ETSO functions, or reference to the TC/ATC/STC process.
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response

Accepted.

The text regarding health monitoring and fault management in 3.1.1.2.3 does not exclude non-ETSO functions. Both sentences have nevertheless been revised to remove any ambiguity.

comment

14 comment by: FAA



	Kirk Baker	3.1.1.2.4- Safety Assessment	Same comment as 3.1.1.2.3
response	<p>Noted. EASA agrees that non-ETSO function has to be covered. The text phrased in Section 3.1.1.2.4 does not distinguish between ETSO and non-ETSO functions. It relates to the F-ETSO article as a whole. No update is required.</p>		

comment	17	comment by: CAA-NL
response	<p>1. The NPA proposes in section 3.1 changes to CS-ETSO Subpart A. The proposed lead in sentence of paragraph 3.2 of CS-ETSO Subpart A starts with "Industry standards referred to ...". However, the FAA documents and MIL standards identified in this paragraph cannot be considered industry standards. It is proposed to change this to "Standards documents referred to ...".</p> <p>Accepted. The text has been changed as suggested.</p>	

comment	22	comment by: UK CAA
response	<p><b>Page No:</b> 9</p> <p><b>Paragraph No:</b> 2.3, 2<sup>nd</sup> paragraph</p> <p><b>Comment:</b> EASA-SWCEH-001 applies to all forms of complex AEH, including ASICs and PLDs therefore we recommend that the second paragraph of 2.3 is amended to remove the word "other".</p> <p><b>Justification:</b> Clarity of guidance</p> <p><b>Proposed Text:</b> Amend to read as follows: "Supplemental guidance material for all airborne electronic hardware..."</p> <p>Accepted. 'Other' has been removed.</p>	

comment	23	comment by: UK CAA
	<p><b>Page No:</b> 9</p>	



	<p><b>Paragraph No:</b> 2.4, 3<sup>rd</sup> paragraph</p> <p><b>Comment:</b> It is questioned how the assumptions related to failure conditions will be validated and by whom.</p> <p><b>Justification:</b> Clarity of guidance</p>
response	<p>Noted.</p> <p>It is the responsibility of the installer to assess whether the assumptions are acceptable in a given installation. Please, refer to ARP-4754A for more guidance.</p>

comment	<p>28 <span style="float: right;">comment by: <i>The Boeing Company</i></span></p>				
	<table border="1" style="width: 100%;"> <tr> <td data-bbox="359 788 1200 869">                 Page: 9                  Section 2.3, Paragraph 1             </td> </tr> <tr> <td data-bbox="359 869 1200 967"> <p><b><u>THE PROPOSED TEXT STATES:</u></b>                  ED-80/DO-254 is currently identified as the guidance material.</p> </td> </tr> <tr> <td data-bbox="359 967 1200 1066"> <p><b><u>REQUESTED CHANGE:</u></b>                  Suggest change to AMC 20-152 if available at release of this material.</p> </td> </tr> <tr> <td data-bbox="359 1066 1200 1111"> <p><b><u>JUSTIFICATION:</u></b> Use of more current guidance.</p> </td> </tr> </table>	Page: 9 Section 2.3, Paragraph 1	<p><b><u>THE PROPOSED TEXT STATES:</u></b>                  ED-80/DO-254 is currently identified as the guidance material.</p>	<p><b><u>REQUESTED CHANGE:</u></b>                  Suggest change to AMC 20-152 if available at release of this material.</p>	<p><b><u>JUSTIFICATION:</u></b> Use of more current guidance.</p>
Page: 9 Section 2.3, Paragraph 1					
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<p><b><u>JUSTIFICATION:</u></b> Use of more current guidance.</p>					
response	<p>Noted.</p> <p>AMC 20-152A is not yet available; the intent is to update this full chapter and to refer to it in the same way as AMC 20-115. No such update has yet been made, as EASA is waiting for AMC 20-152A to become available.</p>				

comment	<p>29 <span style="float: right;">comment by: <i>The Boeing Company</i></span></p>				
	<table border="1" style="width: 100%;"> <tr> <td data-bbox="359 1603 1439 1684">                 Page: 9                  Section 2.3             </td> </tr> <tr> <td data-bbox="359 1684 1439 1800"> <p><b><u>THE PROPOSED TEXT STATES:</u></b>                  There is no guidance for use of Commercial-Off-The-Shelf (COTS) intellectual property in Programmable Logic Devices (PLD).</p> </td> </tr> <tr> <td data-bbox="359 1800 1439 1944"> <p><b><u>REQUESTED CHANGE:</u></b>                  Suggest adding guidance for use of COTS intellectual property in PLDS so topic is address before IMA is used by the installer.</p> </td> </tr> <tr> <td data-bbox="359 1944 1439 1998"> <p><b><u>JUSTIFICATION:</u></b> Support more efficient installation of IMA.</p> </td> </tr> </table>	Page: 9 Section 2.3	<p><b><u>THE PROPOSED TEXT STATES:</u></b>                  There is no guidance for use of Commercial-Off-The-Shelf (COTS) intellectual property in Programmable Logic Devices (PLD).</p>	<p><b><u>REQUESTED CHANGE:</u></b>                  Suggest adding guidance for use of COTS intellectual property in PLDS so topic is address before IMA is used by the installer.</p>	<p><b><u>JUSTIFICATION:</u></b> Support more efficient installation of IMA.</p>
Page: 9 Section 2.3					
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<p><b><u>JUSTIFICATION:</u></b> Support more efficient installation of IMA.</p>					





response Noted.  
Subpart A is generic to all ETSO standards, and this section is general to the development of airborne electronic hardware.  
Specificities for IMA ETSO-2C516 are to be found within the standard itself.

comment 103 comment by: *ASD - AeroSpace and Defence Industries Association of Europe*

Minor comment : CS ETSO subpart A § 2.5

**Comment :**

The word 'implements' is confusing considering the ETSO-2C153 is not part of the F-ETSO equipment.

**Proposal:**

Replace "implements" by "uses"

"When the equipment **uses** one (or several) ETSO-2C153-authorized Integrated Modular..."

response Not accepted.

To produce integrated equipment, the word 'implements' is not considered to be confusing, because the ETSO article under approval that integrates a function on an ETSO-2C153 platform actually 'implements' the ETSO-2C153 article.

comment 120 comment by: *ASD - AeroSpace and Defence Industries Association of Europe*

Formal comment :

(CS-ETSO Subpart A § 3.2, page 10)

The coordinates of Eurocae should be updated.

At least the address is obsolete.

response Accepted.  
The address and the phone number have been amended:  
9-23 rue Paul Lafargue  
"Le Triangle" building  
93200 Saint-Denis  
France  
Telephone: +33 1 49 46 19 65



comment	<p>153                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>General comment for SUBPART A and ETSO 2C516</p> <p><b>Comment :</b> In the document platform and module are used with or without "s". In consistency with the applicability defined in the first paragraph of the §1 , platform and module should be written with an "s" : platform(s) and module(s)</p> <p><b>Proposal :</b> To replace all "platform" by "platform(s)" and "module" by "module(s)"</p>
response	<p>Not accepted.</p> <p>In paragraph 3 of Section 1 (Applicability), the words ‘platform or module’ are used in the singular as only one used platform/module is necessary to justify it being an ETSO-2C516 article.</p> <p>In Section 2.5 of Subpart A and in Section 3.1.1.1 it is made clear that it could be more than one platform or module.</p>

comment	<p>154                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Formal comment</p> <p>(General comment for SUBPART A and ETSO-2C516)</p> <p><b>Comment</b> The terminology used to designate an article subject of this ETSO is variable. Especially, the words “article” (or “ETSO article”) and “equipment” (or “ETSO equipment”) are used indistinctly. This may create ambiguousness in the understanding of what is the subject of the ETSOA.</p> <p><b>Proposal</b> We suggest using a unique terminology: “article” / “ETSO article”.</p>
response	<p>Partially accepted.</p> <p>The word ‘equipment’ is used in the ETSO context, and within the industry standards — see Subpart B. The sentences have been revised.</p> <p>In the sentences where ‘ETSO article’ is more appropriate, the word ‘equipment’ has been replaced by ‘ETSO article’. The word ‘equipment’ is necessary in the terminology of F-ETSO equipment, defined to distinguish it from the approved IMA ETSO-2C153 platform.</p>



**3. Proposed amendments - 3.1. CS-ETSO - SUBPART B—LIST OF ETSOs (INDEX 1 AND INDEX 2)** p. 12-13

**3. Proposed amendments - 3.1. CS-ETSO - ETSO-2C516** p. 14-21

comment

12

comment by: FAA

Kirk Baker	<b>3.1.1.2</b> <b>Equipment/Hardware/Software Development</b> Non TSO functions	The last sentence in this section refers to a certification plan. Not clear if this is a ETSO certification plan , or more typically the installation or TC/ATC/STC certification plan.
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response

Accepted.

Since Part 21 Subpart 0 Article 21.A.305 has been revised and will now request a certification ‘programme’, the text has been revised to refer to ‘ETSO certification programme’ instead of ‘certification plan’.

comment

16

comment by: FAA

Brett	Section 3.1.1	Regarding the incremental certification process related to FAA AC 20-170 and associated “letter of acceptance”, applicants in the US have not requested such an incremental approach in any projects thus far. The certification given by the FAA has only been demonstrated in conjunction with a concurrent TC/STC process and our applicants accept that approach. I believe the European industry was under the impression that the FAA was routinely using this incremental approach giving US applicants an economic advantage.
Kirk Baker	4.3.1 Use of an ETSO-2C153 Authorisation - Last Paragraph	If a TSO holder met the requirements that have been listed in this section of the AMC, why would they not qualify to receive credit towards the TC process? What additional activities would be required to by a TSO holder to gain this credit?

response

Noted.



16a: EASA thanks the FAA for clarifying that the provision is not currently used.

16b: According to TIP Rev 6, TSO 153 is an acceptable standard. Specific material may be used to demonstrate compliance with the AMC; however, EASA does not believe that it is necessary to tailor its guidance for such a specific case.

comment

15

comment by: FAA

Brett	ETSO 2C516 Section 3.1.1.2	Although Non-ETSO functions are addressed, incomplete TSO functionality should also be addressed.
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response

Noted.

This standard does not need additional requirements for incomplete TSOs. The ETSO standards for which the ETSO article would implement an incomplete function are within the scope and are covered under the notion of the F-ETSO standard, while non-ETSO functions need to be addressed as well.

So, this is considered to be already implicitly addressed.

comment

15

comment by: FAA

Brett	ETSO 2C516 Section 3.1.1	The scope of 2C516 aligns better with an AMC or AC, as opposed to a TSO MOPs. The sentence that reads “minimum performance standard requirements for the process”. Recommend that EASA review the legality of ETSO 2C516 meeting the intent of an ETSO article per Part 21 and consider moving the majority of this “process related” guidance into 20-170.
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response

Not accepted.

The ETSO-2C516 concept has been reviewed and assessed by EASA and as per Part 21. This standard gives the means to provide incremental acceptance when using an ETSO-2C153 platform.

The comment suggests covering the latter through an AMC. EASA’s assessment can be summarised as follows: the requirements are tailored to the ETSO system, and they define the perimeter of the ETSO article and its authorisation, when using an ETSO-2C153 authorised platform. A set of AMC material applicable across all CSs cannot reach this goal.

Additionally, the incremental ETSO path, independent from the installation approval process, allows industry to build up certification credit, which is reusable by another organisation for a further ETSOA/TC/STC.

Finally, a separate AMC path is anyway offered within AMC 20-170 for aircraft certification.

comment

15

comment by: FAA

Brett	Summary section 2.4, ETSO 2C516 Section 3.1.1.2.4 and 3.2.1	Industry best standards recognized by the certification authorities describe a “top-down” approach for allocating systems requirements, including safety requirements, starting at the aircraft level. It is unclear how the certification authorities can issue an ETSO 2C516 with any confidence that the critical safety requirements and human factors requirements are complete and correct without a concurrent TC/STC project. To allow a ETSO applicant to “assume” or “anticipate” what all the various safety requirements and human factors design elements that will be required for a specific airplane design puts unreasonable risk onto the ETSO holder and the certification authority. This is why the FAA requires a concurrent TC/STC for issuing a functional TSO on a C153 platform. And the non-TSO functionality plays a major role in this concern, since it can be display or flight controls safety critical. Recommend adding a some additional considerations for when a concurrent TC/STC might be warranted for certain systems that have catastrophic failure conditions, such as FBW flight controls, new and novel display functionality, e.g. Synthetic Vision Guidance Systems, etc.
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Response

Not accepted.

The risk is no different than for other (E)TSOs (such as for standby displays, autopilots), and the risk is to be addressed as for other ETSO articles. The TSO concept is to have equipment approval independent from installations.

In addition, this ETSO standard takes into account this TSO concept without altering it. The process requirements and the perimeter are the basis of the correct use of ETSO-2C153 and what is to be performed to properly demonstrate the function. As such, it takes care of the correct 'use' in another ETSO article approval of the ETSO-2C153 platform. This does not exist today and is seen as a gap if an applicant ever aimed to have a functional ETSO without these specific aspects.

comment

15

comment by: FAA

Judy	2C516 Section 3.1.1.1. minimum performance standards	Closed class on page 16 of 50, does this also include derivatives or major TSO changes to the articles? Please clarify.
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Response

Not accepted.

EASA has already clarified the text in the definition of the class: 'Closed' class refers to ETSO articles that have been integrated and where no evolution has been anticipated (apart from minor changes as per 21.A.611).' This is considered to be very clear and the legal basis is defined.

The notion of derivatives does not fit into the ETSO context, but more into a TC context. The ETSO context foresees minor changes and major changes.

The 'closed' class includes minor changes. Major changes, as per the FAA, require a new application for an ETSO.

comment

15

comment by: FAA

Judy	2C516 Section 3.1.1.1(b)	Does the identification need to be identified on the module as well? Please clarify
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response Not accepted.

This question about identifying ETSO-2C153 on the module relates to the ETSO-2C153 standard, where marking requirements are clearly stated.

(If the question relates to the marking of the ETSO-2C516 article, please see Section 4.)

comment 18 comment by: CAA-NL

1. In the proposed new ETSO-2C516, paragraph 2.2.1, the sentence fragment " ... , and occurrence reports (including Airworthiness Directives) that ... " suggests that an AD is a kind of occurrence report, while the nature of an occurrence report is quite different from the nature of an AD. It is proposed to change this into "... , occurrence reports, and Airworthiness Directives that ... ".

response Accepted.

The text has been updated accordingly.

comment 19 comment by: CAA-NL

1. In the proposed new ETSO-2C516, in a number of instances there are statements such as " <<subject>> shall be compliant with AMC 20-170 Section X.X". By its nature, AMC 20-170 is an acceptable means of compliance but not the only means so requiring in a CS-ETSO that something should be compliant with an AMC 20 is inappropriate. It is proposed to change these references to the AMC to read "Acceptable means of compliance addressing <<subject>> can be found in AMC 20-170 Section X.X". Examples of this are:

- a. paragraph 2.2.2 of the proposed ETSO, sentence on the subject of Change management;
- b. paragraph 2.2.3 of the proposed ETSO, sentence on the subject of open problem reports;
- c. paragraph 3.1.1.2.3 c) of the proposed ETSO, on Configuration Data / Parameter Data Items; and
- d. paragraph 3.1.1.2.3 d) of the proposed ETSO, on Use of tools and tool qualification.

response Not accepted.

EASA understands the nature of the comments but disagrees because there is a need in the ETSO context to lay down the applicable requirements.

ETSO approval is an optional path, but if the applicant wishes to obtain an incremental approval, some requirements have to be laid down, and they are taken from the AMC. This provides for equivalency between the ETSO and the AMC for aircraft TCs.



comment	20	comment by: CAA-NL
	<p>1. The following paragraphs in the proposed new ETSO-2C516 appear to be redundant: the contents of paragraph 3.1.3 is covered in paragraph 3.1.1.2.2(b), and the contents of paragraph 3.1.4 is covered in paragraph 3.1.1.2.1(b).</p>	
response	<p>Accepted.</p> <p>Changes have been made to avoid redundancy. Note that Sections 3.1.3 and 3.1.4 have been kept for homogeneity with the other ETSO standards.</p>	

comment	24	comment by: UK CAA
	<p><b>Page No:</b> 18</p> <p><b>Paragraph No:</b> 3.1.1.2.2(c), Objective 4.3.1.a</p> <p><b>Comment:</b> With reference to the software development guidance, we believe it is equally important to demonstrate the absence of unintended functionality to the degree indicated by the development assurance level.</p> <p><b>Justification:</b> Clarity of guidance</p> <p><b>Proposed Text:</b> Amend to read as follows:</p> <p>‘Demonstrate that each application performs its intended function, <b>IDAL C to A has no unintended functionality</b> and satisfies the related...’</p>	
response	<p>Not accepted.</p> <p>While we agree it is important that software should not contain unintended functionality, the way to ensure that is to follow a process such as ED-12C/DO-178C. The use of such a process is required by paragraph 3.1.1.2.2.(b). The development of software components shall comply with ETSO Subpart A paragraph 2.2, which says that the latest revision of AMC 20-115 is an acceptable means of compliance.</p> <p>The suggested modification of the text is therefore not accepted.</p>	

comment	30	comment by: The Boeing Company	
	<table border="1" style="width: 100%;"> <tr> <td> <p>Page: 15</p> <p>Section 2.2.1, Paragraph 2, line 2</p> <p><b><u>THE PROPOSED TEXT STATES:</u></b></p> <p>DDP</p> <p><b><u>REQUESTED CHANGE:</u></b></p> <p>Please define acronym “DDP”</p> </td> </tr> </table>		<p>Page: 15</p> <p>Section 2.2.1, Paragraph 2, line 2</p> <p><b><u>THE PROPOSED TEXT STATES:</u></b></p> <p>DDP</p> <p><b><u>REQUESTED CHANGE:</u></b></p> <p>Please define acronym “DDP”</p>
<p>Page: 15</p> <p>Section 2.2.1, Paragraph 2, line 2</p> <p><b><u>THE PROPOSED TEXT STATES:</u></b></p> <p>DDP</p> <p><b><u>REQUESTED CHANGE:</u></b></p> <p>Please define acronym “DDP”</p>			





**JUSTIFICATION:** Unknown definition of an acronym.

response

Accepted.  
The text of this paragraph now reads ‘the declaration of design and performance’, rather than ‘DDP’.

comment

8

comment by: FAA

Kirk Baker	<b>2.2.1 Access to the information of the selected ETSO-2C153 platforms/modules</b>	This section describes a process for communication with no detailed criteria that would normally be in a performance standard including a method of showing that one met the standard. When would one know they met the standard? A subjective evaluation that would require on-going process evaluations and would be difficult to standardize.
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response

Not accepted.  
With Section 2.2.1, EASA wants to identify the minimum communication means that has to be established if an applicant wishes to reuse the ETSO-2C153 approval of another company. The section is intended to clarify a minimum set of information and is not prescriptive as regards the method to be used. The approach is actually very similar to some aspects of AC 21-46A/AC 21-50, published by the FAA, in the TSO context; the EASA approach is not more subjective.

comment

9

comment by: FAA

Kirk Baker	<b>2.2.2- Assessment of design changes</b>	This is a process that will be on going and not a technical standard. It will be on going through out the life of the article. Every time the ETSO C-153 holder makes a change the Functional ETSO applicant will have to evaluate that change? What about Functional ETSO changes? Will the C-153 holder have to also do a change impact analysis? Very subjective and would require an on-going process evaluation by potential difference geographically located authorities and difficult to standardize.
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response

Noted.

The comment reflects a potential confusion regarding responsibilities. The text has been drafted by considering the split of the responsibilities between an ETSO-2C153 applicant and an ETSO-2C516 applicant. This section in the ETSO-2C516 standard only focuses on the user of the ETSO-2C153 platform who has to perform the assessment of design changes. See the ETSO-2C153 standard to see the aspects and activities that are requirements on the ETSO-2C153 holder.

The ETSO text requests the applicant to perform an impact analysis on ETSO-2C153 platform design evolutions on the functional ETSO equipment, and to perform the necessary development life cycle activities that are impacted by the ETSO-2C153 changes. This is very similar to what is required for a system when changes are made to some of its equipment. EASA disagrees that this is subjective, and also disagrees with the need for multiple geographical authorities: only the authority that is responsible for the ETSO-2C516 applicant is involved in this context.

comment

10

comment by: FAA

Kirk Baker	<p><b>2.2.2- Assessment of design changes</b></p>	<p>This is a process that will be on going and not a technical standard. It will be on going through out the life of the article. Every time the ETSO C-153 holder makes a change the Functional ETSO applicant will have to evaluate that change? What about Functional ETSO changes? Will the C-153 holder have to also do a change impact analysis? Very subjective and would require an on-going process evaluation by potential difference geographically located authorities and difficult to standardize.</p>
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response

Noted.

This comment is a duplicate of comment #9.

comment

31

comment by: The Boeing Company

<p>Page: 17 Section 3.1.1.2, Paragraph 2, Line 2</p>
<p><b>THE PROPOSED TEXT STATES:</b> “..IMA certification plan..”</p>



	<p><b>REQUESTED CHANGE:</b>                  “..IMA <b>system</b> certification plan..”</p> <p><b>JUSTIFICATION:</b> Use consistent terminology.</p>
response	<p>Not accepted.</p> <p>The certification plan indicated here does not refer to the system but to the ETSO certification programme, as requested per the new revision of Part 21.</p>

comment	<p>39 <span style="float: right;">comment by: GE Aviation</span></p>
response	<p>ETSO 2C516 section 3.1.1</p> <p><b>Problem:</b> The definition of Open depends on "remaining resources". This means that an applicant for ETSO 2C516 must have access to the IMA integration configuration data from the IMA Integrator. It also inserts a dependency on the order in which ETSO 2C516 is granted, such that Company B’s application package for a later ETSO 2C516 &amp; F-ETSO will depend on the application package from Company A’s previous ETSO 2C516 &amp; F-ETSO, because Company B will need to know the resources that remain after installing Company A’s product on the IMA.</p> <p><b>Solution:</b> The definition for “Class Open” should be changed to state “That means there are still shared resources available after integration of all components covered by the F-ETSO, that the constraints for future evolution of the equipment are defined, and that the performance of the remaining resources has been characterized.”</p> <p>Partially accepted.</p> <p>EASA does not concur with the dependency of the IMA integrator or aircraft manufacturer on the development of the ETSO-2C516 article, as stated in the ‘Problem’, but agrees to add, as proposed, the notion of ‘after the integration’ for the characterisation of the remaining available resources.</p>

comment	<p>40 <span style="float: right;">comment by: GE Aviation</span></p>
response	<p>ETSO 2C516 Section 3.1.1.2</p> <p><b>Problem:</b> It’s not clear whether other installed applications on the IMA are considered to be non-ETSO functions.</p> <p><b>Solution:</b> Add a note clarifying that other installed applications on the IMA are not considered to be non-ETSO functions unless there is an intent to gain acceptance of that functionality through the ETSO application process.</p> <p>Not accepted.</p> <p>EASA isn’t sure that we understand the comment, so we hope that the following information may clarify the situation.</p>



If there are other installed applications, they can only come from either the previously approved ETSO-2C153, or a previously approved article under ETSO-2C516, or from the development of the current ETSO article. So, in any case, they have to be declared as ETSO functions or non-ETSO functions at the time of those approvals. So, all functions are known and declared.

comment 49

comment by: *General Aviation Manufacturers Association*

Reference paragraph 3.1.1 (pg. 16) "where no evolution has been anticipated (apart from minor changes per 21.A.611)".

If current 'Closed' IMA systems can undergo Major changes (e.g. introduction of new TSO and/or nonTSO function(s)), the definition of Class Close should not restrict changes to minor.

Please revise the definition to "Class Closed refers to ETSO article that has been integrated with all IMA-related activities considered closed. The performance of the remaining resources are not characterised, meaning only the ETSO 2C516 Holder is allowed to make changes to, or add functionality on this IMA platform."

response

Accepted.

The text has been revised to avoid any possible misunderstandings.

comment 50

comment by: *General Aviation Manufacturers Association*

Reference 3.1.1.1 (c) (pg. 17)

"Any components/functions included in the ETSO-2C153 platforms/modules but unused in the current F-ETSO equipment shall be clearly identified."

Where are the unused component/functions expected to be identified? Also, the term "component" is used to mean different things, so example(s) of what's meant would be helpful.

Please clarify.

response

Accepted.

The text has been revised using the word 'resources' instead of 'components'.

comment 51

comment by: *General Aviation Manufacturers Association*

	<p>Reference ETSO paragraph 3.1.1.2 (pg. 17)</p> <p>"The ETSO certification plan shall describe the F-ETSO equipment and its structural breakdown."</p> <p>The use of the "breakdown" term is not ideal.</p> <p>We suggest replacing this with "physical layout" or "architectual description" or anything other than "breakdown".</p>
response	<p>Not accepted.</p> <p>‘Breakdown’ has several meanings, and here we consider the understanding is straightforward and refers to the decomposition of the article into the sub-level items that make up the article. EASA considers that the wording is clear and prefers to keep it as it is.</p>

comment	<p>52 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p>
	<p>Reference ETSO paragrapg 3.1.1.2 (pg. 17)</p> <p>Expectations for non-TSO functions.</p> <p>FAA guidance for non-TSO functions which are highly complex, or involve high flight crew interaction requires a concurrent TC/STC program.</p> <p>Is it expected the F-TSO applicant will be the installer with a concurrent TC/STC program - is this correct?</p>
response	<p>Noted.</p> <p>The ETSOA concept is independent from installation approvals. It remains valid in the ETSO IMA context.</p>

comment	<p>53 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p>
	<p>Reference ETSO paragraph 3.1.1.2.2 (pg. 18)</p> <p>"software applications" and "software components/hosted applications"</p> <p>There is an inconsistent use of software (SW) component and SW application.</p> <p>We suggest using a single term "hosted application".</p>
response	<p>Accepted.</p> <p>In 3.1.1.2.2.(b), ‘software components’ has been deleted.</p>



comment	<p>54 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.1.2.3 (pg. 19)</p> <p>"The integration of additional hardware simultaneously with software applications, together with an ETSO-2C153 platform/module or additional hardware, into an ETSO-2C153 rack platform."</p> <p>Is the "additional hardware" also 2C153 pedigree, Per Appendix 1 b) the additional hardware is expected to be 2C153?</p> <p>When referring to "additional hardware", we suggest using the term "additional 2C153 hardware".</p>
response	<p>Not accepted.</p> <p>EASA considers that the proposed change would lead to more confusion. In this ETSO standard, the requirement for additional hardware to have an ETSO-2C153 is for 'open' class platforms only. For 'closed' class platforms, that demonstration does not happen because it is not subjected to further IMA development activities. Here, this section requires an integration process as per ED-124.</p>

comment	<p>55 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.1.2.3 (pg. 19)</p> <p>"Task 3 objectives defined in ED-124/DO-297 Table A-3 and Chapter 4.4.1, except Objective 4.4.1 a.,..."</p> <p>What's the reason for this exception for objective 4.4.1 a.?</p> <p>Please clarify why this exception is needed.</p>
response	<p>Noted.</p> <p>Objective 4.4.1 a covers more than the ETSO context, as it mentions aircraft level certification credit. Nevertheless, the activity of planning has to be performed, and it should be addressed in the certification programme, as depicted directly in the ETSO standard. As a consequence, it is fully covered by the standard and the wording is adequate.</p>

comment	<p>56 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.1.2.3 (pg. 19)</p>
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	<p>"...ETSO-2C153 LRU platform"</p> <p>2C153 modules are LRUs. This new term "ETSO-2C153 LRU platform" is not consistent with other references in this document.</p> <p>We suggest either add the definition of a new term or revise to "ETSO-2C153 module".</p>
response	<p>Partially accepted.</p> <p>The sentence has been revised to remove the ambiguity.</p>

comment	<p>57 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.1.2.3 (pg. 19)</p> <p>"... integrated LRU equipment" and "...ETSO-2C153 rack platform."</p> <p>Several different terms are used for what seems to be the same thing. We suggest revising this to reflect an integrated system e.g. "... IMA system" or "... IMA platform".</p>
response	<p>Partially accepted.</p> <p>The sentence has been revised to remove the ambiguity regarding 'LRU'. Nevertheless, 'ETSO-2C153 rack platform' is correct and refers to class RH of ETSO-2C153.</p>

comment	<p>58 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.1.2.3 b) (pg. 19)</p> <p>The two sentences following "In particular:"</p> <p>If these are deemed necessary, then they should be expanded to address non-TSO functions.</p> <p>Please consider either removing the two sentences or update to include both ETSO and non-TSO functionality.</p>
response	<p>Accepted.</p> <p>The text has been revised to include 'the functions of the ETSO article', which covers both ETSO and non-ETSO functions.</p>

comment	<p>59 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p>
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	<p>Reference ETSO paragraph 3.1.1.2.3 c) and d) (pg. 20)</p> <p>"Config Data / PDI and Use of Tools &amp; Tool Qual"</p> <p>Why are these statements referring to ED-24 required?</p> <p>We suggest the removal of items c) &amp; d).</p>
response	<p>Not accepted.</p> <p>EASA understands the nature of the comments but does not agree with them because there is a need in the ETSO context to lay down the applicable requirements, and ED-124 is the industry reference standard for IMA development.</p> <p>ETSO approval is an optional path, but if the applicant wishes to obtain an incremental approval, some requirements have to be laid down and they are taken from the AMC. This provides for equivalency between the ETSO and the AMC for aircraft TCs.</p>

comment	<p>60 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.1.2 (pg. 20)</p> <p>"The impact of the integration of the different platform/modules and additional hardware/software shall be taken into account in the establishment of the qualification test plan."</p> <p>This last sentence seems redundant with regard the previous statements.</p> <p>We suggest the removal of this statement.</p>
response	<p>Accepted.</p> <p>The last sentence has been removed, and the previous one has been revised.</p>

comment	<p>61 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference ETSO paragraph 3.2.1 (pg. 21)</p> <p>"...but driven by the intended aircraft function and the minimum classification indicated in the functional ETSO standard to which the equipment intends to comply."</p> <p>In order to comply with this, it would require a concurrent TC/STC program. Instead of the "and", it should be allowed to use only the minimum classification of the functional ETSO standard.</p> <p>We suggest modification to read "...but driven by the intended aircraft function <b>or</b> the minimum classification indicated in the functional ETSO standard to which the equipment intends to comply."</p>
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response Not accepted.

The intended aircraft function does not relate to a specific installation but to the F-ETSO function. The two elements are taken into consideration when defining the worst-case failure condition classification.

comment 62 comment by: *General Aviation Manufacturers Association*

Reference ETSO paragraph 3.2 (pg. 21)

"The installation manual shall document a means to ensure the compatibility between the ETSO-2C153 module authorisation and the F-ETSO authorisation."

What specifically would the installation manual contain for this?

Please provide additional details on how an applicant is expected to satisfy this requirement.

response Noted.

The sentence has been revised to be more accurate and to associate it with the useful information of the next sentence.

comment 65 comment by: *Embraer S.A.*

Embraer understands that the ETSO-2C516 should accommodate more than one F-ETSO.

In the original text, it is not clear if ETSO-2C516 can accommodate more than one F-ETSO, or if one must apply for a ETSO-C2C516 for each F-ETSO. Since, there are functions and hosted applications that share the same platform resources, it would be logical if one ETSO-2C516 could accommodate more than one F-ETSO, depending on the implemented functions and the associated IMA resource management.

**Proposed change:**

The original text:

*"EUROCAE ED-124 and RTCA DO-297 recognise an incremental IMA system approval by introducing intermediate acceptance steps. ETSO-2C153 authorisation is the first step in the ETSO IMA authorisation process. This ETSO standard, 2C516, is an intermediate step to authorise functional ETSO equipment implementing an ETSO-2C153-authorized IMA platform or IMA modules, when the applicant is seeking compliance credit from these preceding authorisations to demonstrate compliance with a functional ETSO standard. This ETSO standard defines the requirements and delta activities that shall be performed for the authorisation of the integrated F-ETSO equipment.*

*Note: this ETSO standard does not define the minimum operational performance*



*specifications of the defined function; these are defined by the individual 'functional' ETSO standard, with which the applicant may elect to comply (refer to CS-ETSO Subpart A, Section 2.5)."*

should be changed to:

*EUROCAE ED-124 and RTCA DO-297 recognise an incremental IMA system approval by introducing intermediate acceptance steps. ETSO-2C153 authorisation is the first step in the ETSO IMA authorisation process. This ETSO standard, 2C516, is an intermediate step to authorise functional ETSO equipment implementing an ETSO-2C153-authorized IMA platform or IMA modules, when the applicant is seeking compliance credit from these preceding authorisations to demonstrate compliance with a functional ETSO standard. This ETSO standard defines the requirements and delta activities that shall be performed for the authorisation of the integrated F-ETSO equipment.*

*Note 1: This ETSO standard does not define the minimum operational performance specifications of the defined function; these are defined by the individual 'functional' ETSO standard, with which the applicant may elect to comply (refer to CS-ETSO Subpart A, Section 2.5).*

*Note 2: One ETSO-2C516 can accommodate more than one F-ETSO, depending on the number of aircraft functions and hosted applications allocated to the IMA resources.*

response

Partially accepted.

The text of this section has not been revised to reflect the concept of the comment, as ETSO-2C516 is additional to the application for functional ETSO standard(s). The need to comply with ETSO-2C516 is driven from CS-ETSO Subpart A Section 2.5 of the NPA. This section has been revised to ensure that an F-ETSO article may comply with several functional ETSO standards.

comment

66

comment by: *Embraer S.A.*

The applicability of objective "4.3.1 a" also encompasses non F-ETSO. Also, it is not clear to what ETSO standard the objective is referring to, on the second mention of the word "ETSO".

This objective "4.3.1 a" applies to both F-ETSO and non F-ETSO. This is not contemplated in the original text, which appears to address only functions with ETSO associated with them.

Besides this, on the same paragraph, it is not clear to what ETSO standard the text is referring to, on the second mention of the word "ETSO". It appears to be ETSO-C2C153.

**Proposed change:**

The original text:

Objective 4.3.1 a.:

*'Demonstrate that each application performs its intended function and satisfies the related ETSO standard and subpart A 2.2 requirements and the ETSO article requirements while*



*properly utilising the appropriate platform resources and interfacing with other modules and/or applications.’ Particularly it shall be demonstrated that the hosted application on the ETSO-2C153 platform/module complies with the user requirements provided by the ETSO-2C153 provider (see the CS-ETSO/ETSO-2C153 standard – Appendix 3).*

Should be changed to:

**Objective 4.3.1 a.:**

*‘Demonstrate that each application performs its intended function and when applicable satisfies the related ETSO standard and subpart A 2.2 requirements and the ETSO-2C153 article requirements while properly utilising the appropriate platform resources and interfacing with other modules and/or applications.’ Particularly it shall be demonstrated that the hosted application on the ETSO-2C153 platform/module complies with the user requirements provided by the ETSO-2C153 provider (see the CS-ETSO/ETSO-2C153 standard – Appendix 3).*

response

Not accepted.

The ETSO article requirements refer to the complete equipment requirements, and not to ETSO-2C153 platform requirements. Compliance with the ETSO-2C153 user requirements is addressed at the end of the sentence:

*‘...while properly utilising the appropriate platform resources and interfacing with other modules and/or applications. Particularly it shall be demonstrated that the hosted application on the ETSO-2C153 platform/module complies with the user requirements provided by the ETSO-2C153 provider (see the CS-ETSO/ETSO-2C153 standard — Appendix 3).’*

Nevertheless, the text has been revised to mention the F-ETSO article requirements and to avoid any ambiguity.

comment

67

comment by: *Embraer S.A.*

The expression "non-ETSO" seems to be missing.

The text seems to be missing the expression "non-ETSO", since the TSO hardware is already contemplated in the ETSO-2C153 certification.

**Proposed change:**

The original text:

*"- The integration of additional hardware simultaneously with software applications, together with an ETSO-2C153 platform/module or additional hardware, into an ETSO-2C153 rack platform."*

Should be changed to:



response - The integration of additional non-ETSO hardware simultaneously with software applications, together with an ETSO-2C153 platform/module or additional hardware, into an ETSO-2C153 rack platform.

Not accepted.

The additional hardware referred to in Section 3.1.1.2.3 also undergoes ETSO approval during this F-ETSO development. In our opinion, the proposal would not improve the text and could add more confusion.

comment 68 comment by: Embraer S.A.

The expression "non-ETSO" seems to be missing.

The text seems to be missing the expression "non-ETSO", since the TSO hardware is already contemplated in the ETSO-2C153 certification.

**Proposed change:**

The original text:

*"Note: if additional hardware is added to a ETSO-2C153 platform/module, it shall also be considered in the safety assessment."*

Should be changed to:

*Note: if additional non-ETSO hardware is added to a ETSO-2C153 platform/module, it shall also be considered in the safety assessment.*

response Not accepted.

Please refer to Section 3.1.1.2.4. The response is the same as for comment #67.

comment 89 comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]: The term "implements" is unclear. It is not clear whether ETSO-2C516 applies to components to which an IMA module of any ETSO-2C153 class provides shared resources. For instance, does it apply to a LRU connected to a CLASS IF A664 switch? If not, the list of ETSO-2C153 user "types" should be listed per ETSO-2C153 class. If yes, the content of the ETSO-2C516 should be amended accordingly. Indeed, the ETSO-2C516 would still demonstrate the "proper use of the ETSO-2C153 module" and the IMA system integrator could take credit from the ETSO-2C516 compliance.

response Not accepted.

The word 'implements' refers to an ETSO article that integrates an ETSO-2C153 platform into its intended function. This should be differentiated from merely interfacing with a



device. We consider that implementing a function and interfacing with a device are two different notions.

comment

90

comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]: Section 3.1.1.2.1 ED-124 defines an application as a software and/or application-specific hardware [...]. AVIAGE SYSTEMS would therefore have expected the ED-124 task 2 objectives to apply to the development of hardware in the context of the ETSO-2C516. Why is the section equivalent to 3.1.1.2.2.c excluded from section 3.1.1.2.1?

response

Noted.

EASA did not consider the case of an ETSO-2C153 IMA platform offering the capability to users to develop an item of application-specific hardware. The question that can obviously be raised is whether this is a realistic case of IMA sharing capabilities.

The development of an item of application-specific hardware as additional hardware is covered in the ETSO-2C516 standard in Section 3.1.1.2.1, and its integration in Section 3.1.1.2.3.

comment

100

comment by: AIRBUS

### 3.1.1.2.1 - Hardware Development (page 17-18)

Additional hardware with ETSO 2C 153 platforms/modules is not so clear.

How could this work?

Please give an example for a better understanding.

response

Noted.

Some possible examples:

- ✓ an ETSO-2C153 processing module (class PR) with an air pressure sensor board
- ✓ an ETSO-2C153 processing module (class PR) with a GPS board
- ✓ a class PR+ IF+DS+ ETSO-2C153 processing module, with a display head/graphical processor

comment

102

comment by: ASD - AeroSpace and Defence Industries Association of Europe

Minor comment :

#### Comment :

in § 1 first sentence, the word '**implements**' is confusing considering the ETSO-2C153 is



	<p>not part of the F-ETSO equipment.</p> <p><b>Proposal :</b> Replace "implements" by "uses"                  "This ETSO standard is applicable to any equipment presented for an ETSO authorisation to a functional ETSO standard, where the equipment <b>uses</b> one (or several) ETSO-2C153-authorized IMA platforms/modules for which the applicant seeks compliance credit from these ETSOA authorisations to demonstrate compliance with a functional ETSO.</p>
<p>response</p>	<p>Not accepted.</p> <p>The word ‘implements’ refers to the fact that the applicant integrates the ETSO-2C153 platform into the defined F-TSO article to perform the intended function. The F-ETSO applicant is anyway responsible for the integration. The integration effort varies according to the different cases of ETSO platform/modules, and whether there is any assembly of modules, for instance. The word ‘uses’ does not fit in with the case of assembling two different modules and creating one integrated platform. We consider that ‘implement’ fits in better with most cases.</p>
<p>comment</p>	<p>104                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Typo error</p> <p>in § 1 first paragraph, modify "... ETSOA authorisations ..." by "ETSO authorisations ...."</p>
<p>response</p>	<p>Accepted.</p> <p>The text has been amended accordingly.</p>
<p>comment</p>	<p>105                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Minor comment: ETSO 2C516 § 3.1.1.2</p> <p><b>Comment:</b>                  Several wording for the same document is used in the standard ('ETSO certification plan' / 'F-ETSO equipment certification plan' / 'IMA certification plan') . This could lead to misunderstanding.</p> <p><b>Proposal :</b>                  Unify the wording using ETSO certification plan</p>
<p>response</p>	<p>Accepted.</p> <p>The text has been amended to refer to an ‘ETSO certification programme’ and an ‘IMA system certification plan’.</p>



comment 106 comment by: ASD - AeroSpace and Defence Industries Association of Europe

Major comment : ETSO 2C516 - § 3.1.1.1.b)

**Comment:**

In the sentence “The ETSO approval and the part number including issue/minor revisions of the ETSO-2C153 platforms/modules used shall be clearly referenced in the certification plan and in the DDP. “, the Identification (full part number) of the platform/module is not necessary in the ETSO CP.

**Proposal:**

Replace by "The ETSO authorization and the part number including issue/minor revisions of the ETSO-2C153 platforms/modules used shall be clearly referenced n the DDP."

response Partially accepted.

The identification of the ETSO-2C153 platform should still be provided in the CP, but without the issue/minor revision.

comment 107 comment by: ASD - AeroSpace and Defence Industries Association of Europe

Major comment : ETSO 2C516 - § 3.1.1.1.e)

**COmment :**

About the sentence “This also includes the deactivation of unused ETSO-2C153 functions/modules. “

Deactivation of unused function is a means - but not the only mean - to ensure that intended function is performed without any interference but not the only means.

**Proposal:**

Replace by "This also includes the means to ensure that intended function is performed without any interference of unused ETSO-2C153 functions/modules."

response Accepted.

The text has been revised as follows:

‘This also includes the means to deactivate or disable unused ETSO-2C153 functions/modules, when available, or the means to ensure that the intended function is performed without any interference from unused ETSO-2C153 functions/modules.’

comment 109 comment by: ASD - AeroSpace and Defence Industries Association of Europe

Minor comment : ETSO 2C516 - § 3.1.1.2

**Comment:**



	<p>In the sentence 'The F-ETSO equipment certification plan shall introduce the planning, the organisation, the division of tasks and the development, validation, integration, and verification activities conducted on the <b>IMA system</b>, including the tool environment used for those activities.</p> <p>The term "IMA system" is not appropriate in the scope of ETSO 2C156 standard. It is the F-ETSO article</p> <p><b>Proposal:</b> Replace by "The <b>ETSO certification plan</b> shall introduce the planning, the organisation, the division of tasks and the development, validation, integration, and verification activities conducted on the <b>F-ETSO article</b>"</p>
response	<p>Accepted.</p> <p>The text has been revised to state that the F-ETSO equipment certification programme shall introduce the activities conducted on the F-ETSO article.</p>

comment	<p>110                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Major comment : ETSO 2C516 - § 3.1.1 definition of open class (p16)</p> <p><b>Comment:</b> About the sentence "Class Open refers to ETSO article that has been integrated taking into account <b>a future evolution</b> of the equipment in an IMA context" The further evolutions are generally not known at the first certification. The effort of performing the consistency between platform resources and applications usage should be performed only when the change is decided to be implemented.</p> <p><b>Proposal:</b> "Class Open refers to ETSO article that has been integrated taking into account <b>provisions for future evolutions</b> of the equipment in an IMA context"</p>
response	<p>Accepted.</p> <p>The text has been revised to include 'provision for future evolution of the ETSO article'.</p>

comment	<p>111                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Major comment : ETSO 2C516 § 3.1.1</p> <p><b>Proposal:</b> The sentence "That means that there are still shared resources available, that <b>the constraints for future evolution of the equipment are defined</b>, and that the performance of the remaining resources has been characterised" should be clarified to avoid</p>
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response	<p>misundersdanding.</p> <p>Indeed it would occur that the nature of the future evolution is not known at the date of the first certification.</p> <p><b>Proposal :</b> Replace by ""That means that there are still shared resources available, and that the performance and usage constraints of the remaining resources have been characterised"</p> <p>Accepted.</p> <p>In this context, the term 'constraints' refers to resource usage constraints and not to the future development of functions. The sentence proposed fits in with the intended meaning and requirement, so that wording has been included.</p>
comment  response	<p>112                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Minor comment : ETSO 2C516 - § 3.1.1</p> <p>It should be possible that a class closed is changed to a class open at any time thanks to the task of identification and characterisation of the remaining ressources.</p> <p><b>Proposal:</b> Add in 3.1.1 "Note : A F-ETSO article may be changed from class closed to class open (or vice-versa) thought a design change per 21.A.611"</p> <p>Partially accepted.</p> <p>There is a provision for change, but by the same applicant. The text has been amended using different wording.</p>
comment	<p>113                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Major comment : ETSO 2C156 - § 3.1.1.1.c)</p> <p><b>Proposal:</b> In the sentence "Any <b>components</b>/functions included in the ETSO-2C153 platforms/modules but unused in the current F-ETSO equipment shall be clearly identified" :</p> <p>"Component" is design driven and not adequat, as the design of the 2C153 platform(s)/module(s) is part of another authorisation hold by another applicant. Nevertheless the intent is understood by ASD and a proposal is done below.</p> <p><b>Proposal:</b> Replace "component" by "service". "Any <b>service</b>/function provided by the ETSO-2C153</p>



	platforms/modules but unused in the current F-ETSO equipment shall be clearly identified"
response	Partially accepted.  The text has been amended using the word 'resources' instead of 'components'.

comment	<p>114 comment by: ASD - AeroSpace and Defence Industries Association of Europe</p> <p>Major comment : ETSO 2C516 - § 3.1.1.1.d)</p> <p><b>Comment:</b> In the sentence "The applicant shall <b>identify and quantify</b> the usage (used and unused features) of the ETSO-2C153 platform resources, including Health Monitoring and Fault Management resource" :</p> <p>To identify ressources is not the same activity as characterise ressources. Characterisation of unused and remaining ressources is only required for open class and addressed thought Appendix 1 decicated to this class. For class closed, the quantification is not necessary.</p> <p><b>Proposal :</b> as 3.1.1.1.d) is applicable to both class it is proposed "d) The applicant shall <b>identify the used and unused</b> ETSO-2C153 platform resources, including usage of its health monitoring and fault management resources" Quantification is well covered in case of open class in the Appendix 1</p>
response	<p>Not accepted.</p> <p>The EASA understanding is that as part of the demonstration of the proper resource usage of the ETSO-2C153 platform, quantification is important for the development assurance aspects. The activity requested here is not meant to be a characterisation of the remaining resources but of how and how much the F-ETSO article will use the available resources. This information is part of the development process, and it is not intended to be provided to the users in the 'closed' class.</p>

<b>3. Proposed amendments - 3.1. CS-ETSO - ETSO-2C516 - Appendix 1</b>	p. 22-23
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comment	<p>41 comment by: GE Aviation</p> <p>ETSO 2C516 Appendix 1 <u>Problem:</u> It's not clear if the F-ETSO applicant needs to characterize the resulting platform resources assuming only the F-ETSO software and hardware is installed, or if it is assumed all applications are installed. <u>Solution:</u> Add second sentence to section "1-Open platform IMA resources" that says "In characterizing and documenting the resulting platform resources the applicant may</p>
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	<p>assume the IMA System is only configured with those components required to implement the F-ETSO functionality. The integrator is responsible for verifying all IMA systems together.”</p>
<p>response</p>	<p>Not accepted.</p> <p>This sentence is just a general introduction. The three cases are described further with clear requirements for each case. For instance, case a):</p> <p>‘The applicant shall describe the use of the original ETSO-2C153 platform with regard to the ETSO-2C153 Appendix 3 data (such as the user guide) and describe the remaining resources with respect to that Appendix 3 data so that it is clear which shared resources remain available for future incremental development by an independent user or aircraft manufacturer.’</p> <p>The responsibility of the F-ETSO applicant cannot cover other applications beyond the perimeter of the F-ETSO integrated article.</p> <p>The responsibility of the integrator should not be referred to in this ETSO standard as it is addressed in AMC 20-170.</p>

<p>comment</p>	<p>69 <span style="float: right;">comment by: <i>Embraer S.A.</i></span></p> <p>ETSO-2C516 should accommodate more than one F-ETSO.</p> <p>As per comment #1, Embraer understands that it is logical that one ETSO-2C516 can accommodate more than one F-ETSO, depending on the implemented functions and the associated IMA resource management. This is most important to consider, specially when one considers the characterization and documentation of the platform resources and partitioning. However, this information is nowhere explicit in the document.</p> <p><b>Proposed change:</b></p> <p>The original text:</p> <p><i>“When the 2C516-ETSO platform is of class Open, the F-ETSO applicant needs to properly characterise and document the resulting platform resources and partitioning features for the next user.”</i></p> <p>Should be changed to:</p> <p><i>When the 2C516-ETSO platform is of class Open, the F-ETSO applicant needs to properly characterise and document the resulting platform resources and partitioning features for the next user. One ETSO-2C516 can accommodate more than one F-ETSO, depending on the number of aircraft functions and hosted applications allocated to the IMA resources.</i></p>
<p>response</p>	<p>Partially accepted.</p> <p>There is only one F-ETSO article in this context, and the IMA platform is an already</p>



authorised ETSO-2C153 platform. This standard is, in addition to the F-ETSO standards, applicable to the equipment. CS-ETSO Subpart A introduces provisions to allow that the developer of the F-ETSO article may elect to comply with several ETSO standards. This standard does not mandate the partitioning of ETSO functions in the F-ETSO article; this is part of the safety assessment process, and it should be reviewed at installation level. The wording has been improved to avoid misunderstandings.

comment

79

comment by: *General Aviation Manufacturers Association*

Reference ETSO, Appendix 1 (pg. 22)

The definition of Open Class should include a statement regarding both TSO and nonTSO functions.

It's not clear what would need to be done if the changes/additions to an Open Class system only affect nonTSO functionality/functions.

We believe that the non-TSO aspect should also be addressed.

response

Partially accepted.

The Appendix addresses the notions of characterisation and continuity in the health monitoring capability. It is not the purpose of the Appendix to cover design changes. The 'open' class, by definition, refers to the shared capability offered originally by the ETSO-2C153 platform and its remaining usage. This is, by definition, an ETSO-2C153 function. The case of augmentation of resources by the F-ETSO article is covered and is also made applicable to this Appendix. So, EASA does not see the need to distinguish between TSO and non-ETSO functions within the Appendix.

Design change aspects of the 'open' class are covered in the definition of the class. Some additional details have been introduced as follows. This should remove ambiguity, if there is any:

'(\*) the term evolution in this sentence refers to further development of functions using the remaining resources of the IMA, and without affecting the performance of the already authorised F-ETSO function.'

comment

101

comment by: *ASD - AeroSpace and Defence Industries Association of Europe*

Typo error

At the beginning of the appendix 1, the sentence "This appendix is additional is applicable to class Open equipment" contains a typo error

Proposal : "This appendix is applicable to class Open equipment"

response

Accepted.

The text has been amended as suggested.



comment	<p>115                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>ETSO 2C516 - appendix 1 b)</p> <p>Typo : 2CXX to be replaced by 2C516.</p>
response	<p>Accepted.</p> <p>The text has been amended as suggested.</p>
comment	<p>124                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Formal comment</p> <p>(ETSO-2C516 Appendix 1 § 1, pages 22-23)</p> <p><b>Comment</b></p> <p>Three main cases are illustrated. The 1<sup>st</sup> one is identified by an “a)”, the 3<sup>rd</sup> one by a “b)” and the 2<sup>nd</sup> one is not identified.</p> <p><b>Proposal</b></p> <p>Numbering (“a)”, “b)”, “c)”) should be re-established.</p>
response	<p>Accepted.</p> <p>The text has been amended as suggested.</p>



**3. Proposed amendments - 3.1. AMC-20-170 – ToC** p. 24

comment	<p>91 <span style="float: right;">comment by: AVIAGE SYSTEMS</span></p> <p>[AVIAGE SYSTEMS]: How the ETSO/AMC could be applied when modifying an item or system in a certified IMA program?</p>
response	<p>Noted.</p> <p>EASA understands the question as being related to an ‘already’ certified IMA programme (prior to AMC 20-170). On a voluntary basis, any applicant has the possibility to ‘elect to comply’ with new certification material and to add AMC 20-170 to the project certification basis.</p> <p>The change shall be classified as ‘major’, and the applicant will have to apply AMC 20-170. AMC 20-170 shall be clearly mentioned in the certification programme submitted to EASA. Discussions should be held with EASA on the basis of the recommendations provided in Section 3 of AMC 20-170.</p> <p>If credit is claimed from an ETSO, the item must have obtained its ETSOA beforehand.</p>

**3. Proposed amendments - 3.1. AMC-20-170 - 1. Introduction** p. 25-29

comment	<p>42 <span style="float: right;">comment by: GE Aviation</span></p> <p>AMC 20-170 Definitions  <u>Problem:</u> The definition for Usage Domain uses the words “to be respected by the user(s) to ensure that the IMA module continues to meet its characteristics.” If supplier A doesn’t meet these requirements, does this mean that the IMA module can no longer guarantee partitioning for supplier B?”  <u>Solution:</u> State in the definition that “Under all circumstances it is an IMA Platform responsibility to ensure that application A cannot impact application B even if usage domain is not respected by application A.”</p>
response	<p>Not accepted.</p> <p>GE Aviation correctly understood the definition and the issues underlined. An IMA platform should indeed offer capabilities to ensure proper functional isolation. However, any improper configuration/usage of the platform by the users may impair the isolation between the hosted applications (e.g. vulnerabilities in partitioning).</p> <p>The EASA view is that the correct usage of the platform is a responsibility which cannot solely be allocated to the IMA platform, but has to be shared between the contributors to</p>



the IMA system (platform provider/application provider/module integrator).

comment 92

comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]: Section 1.2 - Why is it limited to software only ? see definition of an application in section 1.6.1 which includes hardware Whilst ETSO-2C153 enlarged the scope of application of the IMA concept and clarified what are the various types (classes) of shared resources, the AMC 20-170 seems to limit the users of these resources to application software only, LRM in a rack or hardware in an LRU.

response

Noted.

AMC 20-170 does not limit the use of resources to software. The hardware items are covered by the platform.

The part of this section that mentions incremental certification only talks about software because incremental certification is the process that may be used to approve software applications for use on an IMA platform.

comment 93

comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]: Section 1.6 “Any object [...] used by an [...] application [...]”. In the context of a class IF module, ETSO-2C153 states “For ETSO-2C153 CLASS IF, the IMA module provides shared resources in terms of interfaces between hosted applications, modules and/or components”. A typical “user” of a class IF module is an A/C function system LRU connected to a A664 switch. Is this LRU considered as an application as defined in the “resource” definition?

Generally, it is not clear in the proposed AMC whether the ED-124 task 2 objectives apply to the development of such an LRU. Especially, the switch developer would define a usage domain and the A/C function system LRU developer would characterize its need in terms of resource usage (VL) and show compliance to switch usage domain. This corresponds to the key IMA specificities of the ED-124 task 2 as defined in section 3.1.3.1. Shall the ED-124 task 2 objectives apply to the A/C function system LRU? It would be in line with the concept of incremental certification process defined in section 4.1 where the allocation of the switch resources to a new A/C function system LRU connected to it does not invalidate any of the verified requirements of the already verified A/C function system in which the LRU is integrated. If not, what are the ED-124 objectives applying to the A/C function LRU and system and how the concept of incremental certification process can be used for an ETSO-2C153 IF class “user”?

On the same line it is not clear whether ETSO-2C516 applies to this A/C function system LRU. The benefit would be that the ETSO-2C516 compliance credit would be used as a credit for the compliance to the switch usage domain for the next level of integration. The same apply to all LRU using an ETSO-2C153 class for which ETSO-2C153 chapter 3 states “The IMA module does not offer the capability to host applications unless combined with a Class PR approval” in the sections where the classes are defined.



response

Noted.

An ETSO-2C153 class IF module is considered to be an IMA 'resource' offered by the platform. The definition of application refers to the 'set of interfaces' that are needed for the integration of the IMA resource.

Considering the use case described in the comment, EASA understands that there could be different possible scenarios. A comprehensive answer depends on how the LRU system relates to the IMA system. Practical use cases should be discussed with EASA in the frame of specific certification projects.

comment

125

comment by: ASD - AeroSpace and Defence Industries Association of Europe

Formal comment:

(AMC 20-170, § 1.2 page 25)

**Comment**

*"[...] IMA systems installed in aircraft or rotorcraft."*

A rotorcraft is one type of aircraft. Moreover, in order to be fully consistent with the scope indicated in § 1.1, one should not only consider aircrafts.

**Proposal**

*"[...] IMA systems installed in a product, part or appliance."*

response

Not accepted.

This AMC does not directly apply to parts or appliances. The requirements for parts or appliances related to IMA items are available within ETSOs 2C153 and 2C516.

comment

127

comment by: ASD - AeroSpace and Defence Industries Association of Europe

Minor comment:

(AMC 20-170 § 1.4 page 26 &amp; § 1.5.2 page 27)

**Comment**

For software, AMC 20-115() should be used instead of ED-12()/DO-178() alone.

**Proposal**

We propose to:

- Remove ED-12()/DO-178() from § 1.4,
- Move AMC 20-115() from § 1.5.1 to § 1.4.

Notice that there is no need to list ED-12 in § 1.5.2, because it is only referenced in:





	<p>- § 5.2, where we suggest referencing AMC 20-115() instead (see comment 146),  - § 5.5, only in the title of ED-94C, whereas ED-94C is listed in § 1.5.2</p>
response	<p>Partially accepted.</p> <p>EASA considers it useful to identify the documents (standards) to be used in conjunction with the AMC.</p> <p>A note has been added in Section 1.4 to link ED-12 with AMC 20-115.</p>
comment	<p>130                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Formal comment:</p> <p>(AMC 20-170 § 1.5.2 page 27 and 1.6.2 page 28)</p> <p><b>Comment</b>  ARINC 653 is only referenced in the definition of the abbreviation “APEX” and “APEX” is defined but not used.</p> <p><b>Proposal</b>  Remove the reference to ARINC 653 from § 1.5.2 and the abbreviation “APEX” from § 1.6.2.</p>
Response	<p>Accepted.</p> <p>EASA agrees with the proposal and has removed these two terms.</p>



**3. Proposed amendments - 3.1. AMC-20-170 - 2. Background** p. 29-32

comment	<p>76 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 2.2 (pg.31)</p> <p>"the industrial organisation and work sharing;"</p> <p>We consider the use of the term "industrial" as not appropriate.</p> <p>We suggest: "the organisations and work sharing".</p>
response	<p>Not accepted.</p> <p>The word 'industrial' merely means 'relating to or characterised by industry'. The organisations that carry out the work are industries, so EASA considers that the wording is appropriate.</p>

comment	<p>77 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 2.2 (pg. 31)</p> <p>"This breakdown may depend on..."</p> <p>We consider the use of the term "breakdown" term to be not appropriate.</p> <p>We suggest the folowing wording: "This structure may depend on..."</p>
response	<p>Not accepted.</p> <p>'Breakdown' has several meanings, and one of them is the decomposition of an item into the components that make up the item. In this case, an IMA system is decomposed into aircraft systems (ATA Chapters), as described in the title of the paragraph. The wording, therefore, seems to be appropriate.</p> <p>The word 'structure' has already been used as a verb in the previous sentence. Using it again as a noun in this sentence in place of 'breakdown' would be confusing.</p> <p>Thus, EASA considers that the wording is clear and prefers to keep it as it is.</p>

comment	<p>94 <span style="float: right;">comment by: <i>AVIAGE SYSTEMS</i></span></p> <p>[AVIAGE SYSTEMS]: Section 2.3 and general - for the LRU only connect to IMA network and I/O, does this AMC/ETSO apply?</p>
response	<p>Noted.</p> <p>This AMC/ETSO does not apply to LRUs that are connected to an IMA network and to I/O,</p>



but to the items that are directly part of the IMA system (i.e. the IMA platform/module and hosted applications).

**3. Proposed amendments - 3.1. AMC-20-170 - 3. Policy for IMA system certification** p. 32-38

comment	32	<p style="text-align: right;">comment by: <i>The Boeing Company</i></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Page: 37 Section 3.3, Paragraph 3, Line 1</p> <p><b><u>THE PROPOSED TEXT STATES:</u></b> “..IMA certification plan..”</p> <p><b><u>REQUESTED CHANGE:</u></b> “..IMA <b>system</b> certification plan..”</p> <p><b><u>JUSTIFICATION:</u></b> Use consistent terminology.</p> </div>
response		<p>Accepted.</p> <p>EASA agrees with the proposal. The word ‘system’ has been added.</p>

comment	43	<p style="text-align: right;">comment by: <i>GE Aviation</i></p> <p>AMC 20-170 Section 3.1.3.1</p> <p><u>Problem:</u> For Task 3, Section 3.1.3.1 only mentions one side of the contract between application and IMA platform; it’s missing implementation of the resource requests into IMA configuration files and verification of those files.</p> <p><u>Solution:</u> Add: “...resource requests from the application are verified to be implemented in the IMA configuration files”</p>
response		<p>Partially accepted.</p> <p>The sentence before the IMA specificities in Section 3.1.3.1 reads: ‘Among the considerations detailed in the ED-124 tasks, the key specificities are...’ This means that the section does not attempt to give an exhaustive list of items involved in the tasks, and in fact, it only mentions one aspect of each task.</p> <p>However, as it is indeed an important item to mention, the sentence has been completed as follows: ‘...and the proper implementation of the resource and platform configuration requests from the applications.’</p>



comment	<p>44 <span style="float: right;">comment by: GE Aviation</span></p> <p>AMC 20-170 Figure 5  <u>Problem:</u> The IMA System Perspective is not currently supported by ARP 4754A, DO-178C, or DO-254, which already have defined their process interfaces to exclude ED-124. In addition, ED-124 does not fully address many of the activities in ARP 4754A.  <u>Solution:</u> Remove the left option.</p>
response	<p>Not accepted.</p> <p>It is necessary to have two approaches to develop an IMA, as described in Section 3.1.3.2 and shown in Figure 5. The development of an IMA system may be considered to be encompassed/merged as part of an aircraft certification, which is the case on the right, but it could also be seen as developed as a stand-alone system. In that case, it is necessary to have the approach shown on the left of Figure 5.</p> <p>EASA agrees that ED-124 and ED-79 have different objectives, and that using one of these standards will not mean that all the objectives of the other standard are covered, so the text of this section says that the IMA-specific objectives of ED-124 need to be addressed separately from the ED-79 objectives.</p> <p>The text does not say that use of the ED-124 objectives will cover the ED-79 objectives, as the comment seems to suggest.</p>

comment	<p>45 <span style="float: right;">comment by: GE Aviation</span></p> <p>AMC 20-170 Section 3.1.3.3  <u>Problem:</u> The text says “However, the applicant may integrate and verify applications independently on the IMA platform, taking into account the platform properties.” If this were a perfect world where humans modeled and implemented the IMA requirements and interfaces perfectly, then this strategy might work. But requirements are not perfectly specified or implemented and analyses are not perfectly performed. Engineers have always found that it is important to try things out in the real world. Task 3 confidence testing is still essential to supplement any analysis or assumptions that Task 1 has perfectly implemented robust partitioning and resource management and that the IMA configuration files have been perfectly implemented and analyzed.  <u>Solution:</u> Replace the statement with “Task 3 requires the IMA Integrator to perform confidence testing that substantiates the worst case analyses when all applications are integrated together onto the platform.”</p> <p>AMC 20-170 Section 3.1.3.3  <u>Problem:</u> The bottom-up approach for validation does not include an activity to ensure the resource requests have been accurately and completely implemented by the IMA Integrator into the IMA configuration files.  <u>Solution:</u> Add: “A bottom-up approach must also verify (per Task 3) that the IMA configuration files have been accurately implemented into the IMA configuration files.”</p>
response	<p>Not accepted.</p> <p>EASA considers that the text starting ‘However, the applicant may integrate...’ is correct, and that the situation it describes has always been true. However, EASA agrees that the</p>



integration of all the applications together and conducting confidence testing, as mentioned in your comment, is a good idea. The statement in the text does not contradict that. It merely states that applications may be integrated one at a time so that readers of ED-124 Chapter 3.1.3 d.2) do not get the impression that no integration can be done unless all the applications are installed. In any case, Section 3.1.3.3 merely gives examples of tailoring, and it was not intended to state all the activities that need to be done in a particular task.

Regarding the second item of the comment, the point you mention is valid; however, the text focuses on a flexible framework for validation activities, not on the verification of the implementation.

comment

70

comment by: *Garmin International***Page 37 Section 3.3:**

Section 3.3 includes the following:

“An IMA system certification plan should introduce the planning, the organization, the work share, work packages, and the development, validation, integration, and verification activities of the IMA system.”

This statement can be interpreted as an open-ended requirement that the applicant provide an explanation of the business relationships between business entities and tracking of that relationship.

It is suggested that this statement should be amended as follows to limit the scope of the request to the information relevant to the AMC:

“An IMA system certification plan should introduce the planning, the organization, the work share, work packages, and the development, validation, integration, and verification activities of the IMA system as required to satisfy the ED-124 objectives.”

response

Not accepted.

The first paragraph already states that the ED-124 objectives can be met by using various industrial mappings, based on the sharing of roles, activities, and life cycle data. The second paragraph states that the IMA system certification plan should introduce the nature of the organisations and activities, and it is already implicit from the first paragraph that the IMA system certification plan explains these aspects in order to show how the ED-124 objectives can be met.

comment

71

comment by: *Embraer S.A.*

Attachments [#1](#) [#2](#)

Replace figure 4 of NPA 2017-11 with figure 4 of ED-124.



	<p>In order to harmonize with EUROCAE ED-124 / RTCA DO-297, it would be better if figure 4 of NPA 2017-11 could be replaced with figure 4 of ED-124.</p> <p><b>Proposed change:</b></p> <p>The original text:</p> <p><i>"Figure 4 illustrates a mapping between the architecture of an IMA system and Tasks 1 to 4 of ED-124:</i>  <u>See annex 1</u>  <i>Figure 4 – Breakdown of an IMA system and mapping to ED-124 tasks"</i></p> <p>Should be changed to:</p> <p><i>"Figure 4 illustrates the system certification tasks of ED-124:</i>  <u>See annex 2</u>  <i>Figure 4 – IMA system certification tasks illustration</i></p>
response	<p>Partially accepted.</p> <p>EASA does not consider that Figure 4 of ED-124 is equivalent, as it does not adequately highlight the breakdown per system function (ATA) and the 'matrix' of A/C functions versus tasks.</p> <p>Nevertheless, EASA agrees that the text could be clarified, and proposes to reword it as follows:</p> <p>'Figure 4 illustrates a mapping between an IMA system breakdown and the certification tasks of ED-124:</p> <p>Figure 4 — Mapping between an IMA system and the ED-124 certification tasks'</p>
comment	<p>72 <span style="float: right;">comment by: <i>Embraer S.A.</i></span></p> <p>An IMA certification plan is not mandatory provided its role is performed by other document(s).</p> <p>The objectives of the "IMA system certification plan" can be met by other documents and a specific plan should not be mandatory. For instance, the role of the certification plan can be done by the System Certification Plan that incorporate other sub-systems besides the IMA system.</p> <p><b>Proposed change:</b></p> <p>The original text:</p> <p><i>"3.3. Role of the certification plan</i></p> <p><i>ED-124 objectives can be met by using various industrial mappings, based on the sharing of roles, activities and life cycle data. The strategy selected for showing compliance with this AMC should be defined by the applicant in their certification plans.</i></p>



	<p>[...]</p> <p>- A description of the development and verification environments, with emphasis on the tools used to generate data or automate the activities and the rationale for the qualification or non-qualification of the tools."</p> <p>Should be changed to:</p> <p>3.3. Role of the certification plan</p> <p>ED-124 objectives can be met by using various industrial mappings, based on the sharing of roles, activities and life cycle data. The strategy selected for showing compliance with this AMC should be defined by the applicant in their certification plans.</p> <p>[...]</p> <p>- A description of the development and verification environments, with emphasis on the tools used to generate data or automate the activities and the rationale for the qualification or non-qualification of the tools.</p> <p>- A dedicated IMA certification plan may not be required provided its role is performed by other documents in the applicant's data package.</p>
response	<p>Accepted.</p> <p>EASA agrees that a specific IMA system certification plan may not be required if the information requested is provided in an equivalent manner in other items of the applicant's data package. Text stating this has been added accordingly.</p>

comment	<p>78 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 3.2 (pg. 36)</p> <p>Requiring all three of the criteria listed for the previously recognised means of compliance seems overly restrictive.</p> <p>Further, CRIs for existing IMA system were addressed by the installer, so all of the substantiation data may not be available to the IMA system developer or future installers.</p> <p>We consider allowance should be given for approved IMA systems which cannot provide data to substantiate all three of these criteria.</p>
response	<p>Not accepted.</p> <p>While it is correct that previous IMA CRIs have usually been agreed with EASA by the airframe company (the applicant), the agreed CRI has then applied to all the companies involved in the IMA system, including the IMA system developer, who were responsible for providing data on their activities to EASA via the airframe company. They would,</p>



therefore, have the CRI and all the data related to the activities they conducted in developing the IMA system.

The producer of a previously produced IMA system that was certified by EASA would, therefore, be able to fulfil all three conditions given in 3.2.

A company that did not fulfil all three conditions would not have been able to obtain certification for its IMA system.

comment	<p>80 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 3.3 (pg. 37)</p> <p>"...ED-124 objectives can be met by using various industrial mappings," and "The industrial organisation supporting..."</p> <p>We believe the use of the term "industrial" is not appropriate.</p> <p>We suggest revising the above statements to: "...ED-124 objectives can be met by using various organizational arrangements," and "The organisations supporting..."</p>
response	<p>Not accepted.</p> <p>The word 'industrial' merely means 'relating to or characterised by industry'. The organisations that carry out the work are industries, so EASA considers that the wording is appropriate.</p>

comment	<p>81 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 4. (pg. 38)</p> <p>Incremental Certification Process</p> <p>From the table in this approach, it only seems possible for an applicant who's a DOA.</p> <p>Is this the intent of incremental Certification, it to only seems to be possible for DOA organizations? What about validations by EASA of IMA systems approved by other Cert Authorities? Please clarify.</p>
response	<p>Noted.</p> <p>This AMC document has been developed within the EAA system, it is therefore deemed to be relevant to refer to the EU legal framework and DOA.</p> <p>Nevertheless, in the frame of a validation project applying this AMC, the responsibilities will be discussed but it is quite likely that they will still fall within the scope of the applicant (TC holder/OEM) that submits the system for certification.</p> <p>The text has been revised to focus on the responsibility of the applicant instead of the</p>





responsibility of their DOA. Section 4.1 has also been clarified.

comment

95

comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEM]: The examples to illustrate the IMA architecture (figures 1,2,3 and 4) narrow the scope of the ED-124 application to software applications running on a processing module. The AMC would gain in clarity if different examples picked up from the various classes defined in ETSO-2C153 were used. For example LRUs connected to the communication network are not shown as part of the ED-124 task 2 or task 3 scope in the figures listed above.

On the other hands, there are several references to a certification task equivalent to task 2 not only applicable to software:

- Figure 5 shows the ED-79 going down to the Tasks 1&2 scope
- Section 3.3, 4th topic, 2nd bullet considers an independent verification of aircraft functions allocated to the IMA system, which looks like a task 2 enlarged to A/C function
- Section 4, paragraph 4 considers the incremental certification applies to system before it is configured, integrated and certified as part of the final product, - which looks like a task 2 enlarged to A/C function systems.

response

Partially accepted.

A note referring to the ETSO 2C153 examples is added below Figure 1.

- *Figure 5 shows the ED-79 going down to the Tasks 1&2 scope*  
 Tasks 1&2 are not fully covered by the ED-12() & ED-80 activities; some ED-124 objectives could be addressed using ED-79.

- *Section 3.3, 4th topic, 2nd bullet considers an independent verification of the aircraft functions allocated to the IMA system, which looks like a task 2 enlarged to A/C function.*

- *Section 4, paragraph 4 considers the incremental certification applies to the system before it is configured, integrated and certified as part of the final product, which looks like a task 2 enlarged to A/C function systems.*

Only the part of the A/C functions implemented and hosted in the IMA are targeted, not the full A/C functions. Moreover, Section 3.1.2 states:

- *It is not the intent of this AMC to cover the development processes for aircraft functions, even if they are implemented by applications hosted in an IMA system.*

comment

96

comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]:

Figure 4 in AMC Section 3.1.3.1 shows Configuration as belonging to tasks 2 and 3, but there is no clarification of the role Task 2 plays in developing this configuration.

response

Noted.

Figure 4 shows a mapping between the architecture of an IMA system and Tasks 1 to 4, but the figure and Section 3.1.3.1 that contains the figure are not intended to give details of all the activities involved in all the tasks. Those details are in ED-124, and were



deliberately not copied into AMC 20-170. Section 5.2 provides references to where information regarding configuration data may be found in ED-124, and it mentions Chapters 3.7.1.1 and 3.7.1.2.

comment	97	comment by: AVIAGE SYSTEMS
	<p>[AVIAGE SYSTEMS]: Section 3.1.3.1 A Task 3 specificity is the need to configure an IMA platform in accordance with resources defined by IMA users. This is an activity requiring specific coordination of assumptions and guarantees.</p> <p>A Task 3 specificity is the need to coordinate verification activities such that the integrated IMA system performance can be guaranteed without requiring re-verification of each hosted application on the entire integrated system.</p>	
response	<p>Partially accepted.</p> <p>Section 3.1.3.2 does not attempt to cover all the specificities of each task, it merely states what was considered to be some of the key specificities, and it only mentions one specificity of each task.</p> <p>However, the requested clarification has been added in Section 3.1.3.3 to introduce the tailoring of ED-124 tasks.</p>	

comment	133	comment by: ASD - AeroSpace and Defence Industries Association of Europe
	<p>Formal comment:</p> <p>(AMC 20-170 § 3.3 page 38)</p> <p><b>Comment</b>  <i>“The activities to be completed for the installation of an ETSO-2C153 or 2C516 equipment;”</i>                  Strictly speaking, an ETSO-2C153 article, being a platform or a module, is not an “equipment”.</p> <p><b>Proposal</b>  <i>“The activities to be completed for the installation of an ETSO-2C153 or 2C516 article;”</i></p>	
response	<p>Accepted. EASA has modified the wording as proposed.</p>	



**3. Proposed amendments - 3.1. AMC-20-170 - 4. Incremental Certification Process** p. 38-41

comment 33

comment by: *The Boeing Company*

Page:39  
Paragraph: *Table (unnumbered)*

**THE PROPOSED TEXT STATES:**

The entire table

**REQUESTED CHANGE:**

*Remove the table*

**JUSTIFICATION:** The table is not referenced or explained. Further, given the lack of a formal means to incrementally approve parts, it would seem more appropriate for the guidance to just state that the applicant should propose an approach to cataloging progressive verification/validation activities for purposes of substantiating the validity of successive activities.

response

Not accepted.

As indicated in the second column, the table is further developed in Sections 4.x.

The lack of any formal means to incrementally approve the parts of the system is the subject that is addressed by this table and the sections that follow it. EASA considers it necessary to provide more specific guidance on the evidence that will be recognised to support incremental certification.

Within the established framework, it is EASA’s viewpoint that a 2C153 or 2C516 ETSOA, or software acceptance from an applicant, are appropriate and sufficient ‘formal means’ to support incremental certification.

comment 34

comment by: *The Boeing Company*

Page: 40  
Paragraph: *4.1*

**THE PROPOSED TEXT STATES:**

i.e. application axis independence

**REQUESTED CHANGE:**

*Remove this text.*

**JUSTIFICATION:** “application axis independence” is an undefined term and it doesn’t appear to add to, or clarify the discussion.



response Accepted.  
The first part of the text is self-contained and EASA agrees to remove the notion of an axis, which was not further developed, and to clarify the first part of Section 4.1.

comment 35 comment by: *The Boeing Company*

Page:40  
Paragraph: 4.1

**THE PROPOSED TEXT STATES:**

For instance, a final software and hardware review (SOI#4) on the components of a module and the acceptance of the corresponding software and hardware accomplishment summaries could support the completion of ED-124 Task 1

**REQUESTED CHANGE:**

*Remove this text*

**JUSTIFICATION:**

This is presented as an example, but past experience shows that examples such as this tend to become the expected means, and there are several issues related to the example approach. The prior paragraph rightly states that the applicant should propose an approach, and that seems sufficient without this example.

response Partially accepted.  
EASA considers that it is necessary to provide more specific guidance on the evidence that will be recognised to support incremental certification.  
The example is relevant, as the final software/airborne hardware review performed by applicants is the means recognised by the certification community to check the completeness/status of the software/airborne hardware activities and to complete the demonstration of compliance with ED-12()/ED-80.  
Nevertheless, as mentioned in Section 4.1, applicants are encouraged to define their own criteria.  
EASA agrees to clarify Section 4.1 and Table 4.

comment 36 comment by: *The Boeing Company*

Page: 40  
Paragraph: 4.2.1

**THE PROPOSED TEXT STATES:**

If **some** changes are necessary, a change impact analysis should be performed to identify



the scope of the changes and the necessary activities to be re-engaged in order to cover the changes.

**REQUESTED CHANGE:**

Add prior to this text: *IMA components that were previously approved may be used providing the components meet appropriate criteria for reuse. Refer to ED-124, task 6, ED-12 section 12.1, and ED-80 section 11.1 for guidance.*

**JUSTIFICATION:**

The current text only covers changes in the component, with no guidance on actually reusing the component.

response

Partially accepted.

Section 4.2.1 targets 'legacy' systems prior to this AMC or ED-124, which may not have the initial set of data as requested by ED-124 Section 4.7.6.1. In addition, as identified in Section 3.2, ED-124 is not the only means to show compliance with this AMC, and EASA considers it to be necessary to keep the guidance in Section 4.2.1 decoupled from ED-124. However, EASA agrees that components may be reused, and that this could be better stated. Section 4.2.1 has therefore been modified.

comment

82

comment by: *General Aviation Manufacturers Association*

Reference AMC sections 4.1 & 4.2 (pg. 40)

Incremental component qualification & Reuse of components.

"For instance, a final software and hardware review (SOI#4) on the components of a module and the acceptance of the corresponding software and hardware accomplishment summaries".

Unless the organization is a DOA, would this mean EASA would need to perform the Final reviews? Please clarify.

response

Noted.

EASA understands the questions in the frame of a validation. Not having a DOA does not imply a systematic review of the certification artefacts (e.g. MoC).

In line with the usual validation process, EASA would identify the need to perform the final reviews based on the retained validation items and the level of involvement.

In these sections, EASA wants to:

- identify the need for evidence to support the claim (e.g. for completion of Tasks 1 & 2);
- put emphasis on the responsibility of the applicant to assess the evidence supporting the credit.



What was targeted is the level of responsibility of the applicant in the 'incremental certification' process. For non-EU projects, meaning with applicants who do not have a DOA, the applicant is still in charge of assessing and substantiating the relevance of the 'credit'.

To avoid any ambiguity, the term 'DOA' has been removed, and EASA will simply refer to the applicant's responsibility.

comment

83

comment by: *General Aviation Manufacturers Association*

Reference AMC section 4.2.1 (pg. 40)

For legacy IMA system with change(s), to what extent is the applicant expected to comply with the 2C516.

We have concern over the existing legacy systems that never fully satisfied objectives of this new ETSO. Incremental changes to legacy systems should be limited to items affected in the CIA.

response

Noted.

Compliance with 2C516 is not a mandatory path, but a means offered to generate credit for the certification of the installation.

Compliance of legacy IMA systems with AMC 20-170 will be discussed on the basis of the existing material accepted for the initial/previous certification and the intended changes (CIA).

comment

84

comment by: *General Aviation Manufacturers Association*

Reference AMC section 4.3.2 (pg. 41)

"Nevertheless, the functional ETSOA does not by itself ensure that the platform(s)/module(s) is technically adequate to be integrated into the IMA system. The applicant remains responsible for all the activities to ensure the proper integration of the application(s)/module(s)/platform(s) into the IMA system,..."

We are concerned that the way this is worded, it doesn't seem to allow very much "credit" for the 2C516 ETSO. Please clarify.

response

Partially accepted.

For the demonstration of compliance with this AMC, the need for credit for Tasks 2 and 3 is clearly indicated. However, the applicant has to justify that the credit is relevant (e.g. at a minimum that the part has obtained a 2C516 ETSOA).

For a 2C516 'open' class article, if more modifications are intended, more complementary certifications will be required.

The text has been slightly clarified in Sections 4.3.1 and 4.3.2:



— ‘substantiate the scope of the ETSOA compliance credit and define the complementary certification activities.’  
Section 4.3.3 has been added to clarify the level of credit.

comment 98 comment by: AVIAGE SYSTEMS

[AVIAGE SYSTEMS]:  
Section 4.1 “during the verification activities, credit may be taken from the integration of the application and from the lack of impact on other already verified and installed applications.” – for Task 2 verification, credit needs to be taken for the availability of required resources – that is, the Task 2 activity assumes the resources will be available and the Task 3 activity validates that assumption. In Task 2, no knowledge is assumed regarding other installed applications.

response Partially accepted.  
EASA technically agrees with your viewpoint. However, what is addressed in Section 4.1 is how to formalise this incremental approach, rather than the provision of specific considerations on incremental verification.  
Section 4.1 has nevertheless been revised to clarify the intent.

comment 108 comment by: ASD - AeroSpace and Defence Industries Association of Europe

Major comment : AMC 20.170 4.3.1. Use of an ETSO-2C153 Autorisation

**Comment :**

About the sentence “This also includes the deactivation of any unused functions/modules.”

Deactivation of unused function is a means - but not the only mean - to ensure that intended function is performed without any interference but not the only means.

**Proposal:**

Replace by "This also includes the means to ensure that intended function is performed without any interference of unused ETSO-2C153 functions/modules."

response Accepted.

The sentence has been revised to cover disabling mechanisms:

- (a) This also includes the means of deactivation or **disabling** of unused ETSO-2C153 functions/modules, when available, or the means to ensure that the intended function is performed without any interference from unused ETSO-2C153 functions/modules.

comment 137 comment by: ASD - AeroSpace and Defence Industries Association of Europe



response	<p>Formal comment:</p> <p>(AMC 20-170 § 4 page 38)</p> <p><b>Comment</b>  <i>“However, the lack of a TSO authorisation (TSOA), a letter of acceptance etc. does not prevent an applicant from incrementally building confidence [...]”</i>                  The sentence is lacking clarity.</p> <p>Moreover, “TSO” is not appropriate.</p> <p><b>Proposal</b>                  We propose rewording the following way:  <i>“However, the lack of an ETSO authorisation (ETSOA) and the absence of ‘letter of acceptance’ concept do not prevent an applicant from incrementally building confidence [...]”</i></p>
	<p>Accepted.                  The text has been amended as proposed.</p>

comment	<p>139                      comment by: ASD - AeroSpace and Defence Industries Association of Europe</p> <p>Formal comment:</p> <p>(AMC 20-170 § 4 page 38)</p> <p><b>Comment</b>  <i>“As indicated in Section 3.2.1, the concepts of a ‘letter of acceptance’ or of a reusable software component (RSC) are not compatible with the EASA system.”</i>                  Reference to § 3.2.1 is not appropriate.</p> <p><b>Proposal</b>                  “3.2.1” should be replaced by “3.1.2”.</p>
response	<p>Accepted.                  The reference has been changed as suggested.</p>

comment	<p>141                      comment by: ASD - AeroSpace and Defence Industries Association of Europe</p> <p>Major comment:</p> <p>(AMC 20-170 § 4.3 page 40 &amp; § 4.3.2 page 41)</p> <p><b>Comment</b>                  This paragraph states that “[...] formal certification credit is offered from an ETSOA granted to [...] Application(s) coupled with an ETSO-2C153 module/platform: ETSO-2C516.”</p>
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	<p>The same wording is used in § 4.3.2: <i>“Through a functional ETSO-2C516 (F-ETSO), an authorisation can be granted to application(s) coupled with an ETSO-2C153 module/platform.”</i></p> <p>This seems to indicate that the 2C516 ETSOA is granted to the application, whereas the proposed ETSO-2C516 seems to indicate that the ETSOA is granted to a piece of equipment composed of a platform + applications.</p> <p><b>Proposal</b> We propose the following sentence: <i>“Through a functional ETSO-2C516 (F-ETSO), an authorisation can be granted to application(s) <b>integrated</b> with an ETSO-2C153 module/platform.”</i></p>
response	<p>Accepted. The text has been changed as suggested.</p>

comment	<p>144 comment by: ASD - AeroSpace and Defence Industries Association of Europe</p> <p>Formal comment :</p> <p>(AMC 20-170 § 4.3.2 page 41)</p> <p><b>Comment</b> <i>“Nevertheless, the functional ETSOA does not by itself ensure that the platform(s)/module(s) is technically adequate to be integrated into the IMA system.”</i></p> <p>Addressing the platform(s)/module(s) does not look appropriate in the context.</p> <p><b>Proposal</b> <i>“Nevertheless, the functional ETSOA does not by itself ensure that the ETSO article is technically adequate to be integrated into the IMA system and installed into the product.”</i></p>
response	<p>Partially accepted. EASA agrees and has amended the wording as follows: ‘Nevertheless, the functional ETSOA does not by itself ensure that the ETSO article is technically adequate to be installed in the product.’</p>

<p><b>3. Proposed amendments - 3.1. AMC-20-170 - 5. Additional recommendations for IMA system certification</b></p>	<p>p. 42-45</p>
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comment	<p>21 comment by: CAA-NL</p> <p>AMC 20-170 para 5.6. Cyber security When EASA gets more competences of cyber security with the new Basic Regulation, EASA should develop their own cyber security standards.</p>
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response

Noted.  
EASA specialists are working on cybersecurity and are taking part in working groups regarding cybersecurity standards (refer to the EASA Terms of Reference for RMT.0648 'Aircraft cybersecurity' (<https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0648>)).

comment

25

comment by: UK CAA

**Page No:** 44

**Paragraph No:** 5.6

**Comment:** We believe it might help industry if some guidance on either the applicable cyber security standards or the required objectives associated with cyber security was provided as this will allow them to better focus their design, testing and ongoing management of the system.

**Justification:** Clarity of guidance.

response

Partially accepted.

EASA specialists are working on cybersecurity and are taking part in working groups regarding the subject on guidance for this topic.

The initial intent was to raise the awareness of the applicants on this topic with respect to ED-124, not to precisely define the cybersecurity standards that are applicable. Recommendations for cybersecurity will have to be globally addressed in the frame of each project.

Therefore, EASA agrees that Section 5.6 does not add any useful material. Section 5.6 has been removed and text has been added to Section 3.1.2 to state that cybersecurity activities are not covered by AMC 20-170.

comment

37

comment by: The Boeing Company

Page:42

Paragraph: 5.2

**THE PROPOSED TEXT STATES:**

In particular, any parameter data item should be assigned the same software level as the component using it.

**REQUESTED CHANGE:**

Remove this sentence.

**JUSTIFICATION:**

The statement circumvents the established and accepted process for establishing assurance levels (i.e. ED-79A/ARP4754A). Given that it has been long accepted that



higher-integrity systems may use lower-integrity data (e.g. network communications with maintenance systems), this requirement seems arbitrary. It is recognized that this same statement appears in ED-12C/DO-178C, but that statement is in a non-normative section. It is far better to use the safety process to identify the hazards associated with the use of the PDI, assign a level, and then apply the appropriate engineering discipline.

response Not accepted.

Configuration data/parameter data items play crucial roles in IMA systems, in particular in defining the usage domain allocation of each software application hosted on an IMA platform. What EASA targets at in this section are not all the PDIs, but the ones that may be developed to configure an IMA module/platform. EASA considers it to be essential that this data has an integrity that is at the same level as the software using it, otherwise the software of one system could interfere with the data or the time allocation of another system, which is not permitted.

comment 38

comment by: *The Boeing Company*

Page: 43  
 Paragraph: 5.5 (*Management of open problem reports*)

**The proposed text states:**

**REQUESTED CHANGE:**

. *Replace entire section with the following or similar text:*

***“Management of problem reports (PRs) during development***

***IMA systems contain multiple applications hosted on the same IMA module/platform, therefore any open problem report related to a module/platform or application, collected at any level, could affect one or several aircraft functions in a direct or indirect manner. In addition to other guidance on problem reporting, the following should be considered for IMA systems:***

- (a) The communication of problem reports between the different IMA stakeholders should be established.***
- (b) The applicant should properly organize the management of problem reports, focusing on:***
  - the initial evaluation of each open problem report by the module developer, precisely describing the effect of the OPR on resource use;***
  - efficient communication of PRs that potentially impact other stakeholders (e.g. hosted applications). This includes impacts on incremental development and verification, as well as***



*impacts on aircraft functions.*  
 — *potential workarounds at the application, system or aircraft levels. In such cases, the efficiency of a workaround should be substantiated and the successful (i.e. complete and correct) deployment of the workaround should be ensured;*

**Management of Open Problem Reports (OPRs)**

**Note:** *OPRs are PRs that are intended to remain open at approval of the product and/or installation.*

*Considering the diversity of stakeholders in an IMA system, the management of OPRs can be more complex than with federated systems. In addition to existing guidance on OPRs, the following should be considered:*

- (a) All OPRs that have any potential to impact hosted functions or interfacing IMA components should be communicated to all stakeholders.*
- (b) Each stakeholder should assess impacts of OPRs and ensure impacts are fed back to the OPR source and integrator.*
- (c) Any changes should account for possible impacts from IMA OPRs”*

**JUSTIFICATION:**

This section appears to co-mingle management of problem reports during development and the management of problem reports open at the time of certification. These need to be separate topics. Considering the diversity of stakeholders in an IMA system, the management of OPRs can be more complex than with federated systems. In addition, it is introducing material that is not IMA-specific, and will be covered by harmonized FAA/EASA guidance in the very near future.

response

Partially accepted.  
 EASA agrees with the intent of Boeing’s proposal. However, EASA would like to focus on OPR management.  
 In order not to overlap with other guidance on OPRs, EASA agrees to refocus the text on the IMA-specific issues.

comment

46

comment by: GE Aviation

In Chapter 1.3 Document Overview, it states that this document (proposed AMC 20-170) will “[complement] ED-124 with additional considerations on dedicated topics such as cybersecurity, open problem reports (OPRs), and configuration files”. However, Chapter 5.6 states “Although there is no specific IMA objective regarding cybersecurity, applicants should consider the potential threats and vulnerabilities of their systems. However, the security aspects described in ED-124 Chapter 5.1.5.8 are not adequate and should be replaced by the applicable cybersecurity standards.”

The applicable cybersecurity standards are not defined in this document and it should be clarified which ones are to be used or how an “applicable standard” is to be identified/selected.



	<p>Potential resolutions:</p> <p>a. Reference the ED-203A standard that will be released by latest middle 2018. This is only an option if the AMC 20-170 is released after this time. According to the Rulemaking and Safety Promotion Programme 2017-2021, the decision on this Rulemaking Task is Q2 2018 so this option may require a delay.</p> <p>b. Reference the security rules using a statement that standards that AMCs to security rules (when released) and/or to CRIs should be applied</p> <p>c. Expand section to describe what is inadequate in Chapter 5.1.5.8 and what aspects need to be covered by standards (e.g. risk assessment, identification of threat conditions, assigning security measures and requirements, testing)</p>
response	<p>Partially accepted.</p> <p>EASA specialists are working on cybersecurity recommendations and the applicable standards (ToR RMT.648).</p> <p>The initial intent was to raise the awareness of the applicants on this topic with respect to ED-124, rather than to define the applicable cybersecurity standards. Recommendations for cybersecurity will have to be globally addressed in the frame of each project.</p> <p>Therefore, EASA agrees that Section 5.6 does not add any useful material. Section 5.6 has been removed and text has been added to Section 3.1.2 to state that cybersecurity activities are not covered by AMC 20-170.</p>
comment	<p>73 <span style="float: right;">comment by: Embraer S.A.</span></p> <p>Harmonize proposed AMC 20-170, item 5.5 (b) with EUROCAE ED-124, section 4.4.6.</p> <p>Item 5.5 (b) should be harmonized with section 4.4.6 (IMA System Accomplishment Summary (IMASAS)). The proposed text does not address all the aspects required by section 4.4.6 of ED-124.</p> <p><b>Proposed change:</b></p> <p>The original text:</p> <p><i>"(b) The applicant should properly organise the management of open problem reports, focusing on:</i></p> <p><i>[...]</i></p> <p><i>- the evaluation of the cumulated effect of each open problem report on all affected aircraft functions;"</i></p> <p>Should be changed to:</p> <p><i>(b) The applicant should properly organise the management of open problem reports,</i></p>



	<p><i>focusing on:</i></p> <p>[...]</p> <p>- the evaluation of the impact of each open problem report on all affected aircraft functions, aircraft safety, IMA system functionality, operations, maintenance and limitations, if applicable;</p>
response	<p>Not accepted.</p> <p>Section 5.5 has been revised to refocus on IMA-specific issues. The impact assessment of OPRs should be covered by other guidance, which is being prepared by EASA (refer to RMT.0643), and therefore it has been removed from AMC 20-170.</p>

comment	<p>74</p> <p>comment by: <i>Garmin International</i></p> <p><b>Page 42 Section 5:</b></p> <p>Section 5 of the AMC and its subsections provides a set of recommendations intended to clarify specific sections of ED-124.</p> <p>It is suggested that the intent of section 5 and its subsections be clarified by including the following in Section 5:</p> <p>“The recommendations in Section 5 are not intended to be interpreted as expected means of compliance when using this AMC to certify IMA systems installed in aircraft or rotorcraft.”</p>
response	<p>Not accepted.</p> <p>With the exception of Section 2, for information, the content of this AMC is intended to specify the expected means of compliance to cope with IMA system installations. In some areas, EASA considers it to be necessary to supplement/clarify ED-124. The supplementary recommendations provided in Section 5 should be considered for IMA system certification.</p>

comment	<p>75</p> <p>comment by: <i>Embraer S.A.</i></p> <p>Considering that the ED-124 does not cover Cybersecurity, Embraer suggests the indications of which would be the applicable standards to cover the ED-124 gap.</p>
response	<p>Partially accepted.</p> <p>EASA specialists are working on cybersecurity recommendations and applicable standards (ToR RMT.648).</p>



The initial intent was to raise the awareness of the applicants on this topic with respect to ED-124, rather than to define the applicable cybersecurity standards. Recommendations for cybersecurity will have to be globally addressed in the frame of each project.

Therefore, EASA agrees that Section 5.6 does not add any useful material. Section 5.6 has been removed and text has been added to Section 3.1.2 to state that cybersecurity activities are not covered by AMC 20-170.

comment 85 comment by: *General Aviation Manufacturers Association*

Reference AMC section 5.3 (pg. 42)

The IMA system is composed of SW and HW. Both of these already have tool qual aspects covered in DO-178 and DO254.

We don't see why IMA tools needs to be treated uniquely? Please clarify.

response Partially accepted.

What EASA targets at in this section are the tools that may be used at system level to support the specific activities related to IMA systems, not the tools that directly fall under DO-178() and DO-254.

It is also EASA's view that ED-124 Section 5.2.3 needs to be supplemented to link tool qualification activities to ED-215.

Clarification has been added in Section 5.3.

comment 86 comment by: *General Aviation Manufacturers Association*

Reference AMC section 5.4 (pg. 43)

"... stage of the process and a formal baseline is established for these components."

What is a "formal baseline"? Please clarify / define this term.

response Noted.

EASA refers to a 'production' baseline that has been officially released (e.g. for system integration, flight tests, etc.), as opposed to a 'development' baseline that is only visible by the application provider.

comment 87 comment by: *General Aviation Manufacturers Association*



response	<p>Reference AMC section 5.7 (pg. 44)</p> <p>"The platform is qualified in conditions of the same severity as experienced when installed on the aircraft, interfaced with its peripherals through the aircraft harnesses, and loaded with its set of applications."</p> <p>This talks about qualification needing an aircraft harness which seems inconsistent with the sub-bullets on testing at various levels of integration.</p> <p>Please consider the following narrative: "The platform is qualified in conditions of the same severity expected when installed on the aircraft, interfaced with its peripherals through the aircraft (or equivalent) harnesses, and loaded with its set of applications.".</p> <p>Accepted.</p> <p>EASA agrees with the proposal. The text has been modified accordingly.</p>
comment  response	<p>88 <span style="float: right;">comment by: <i>General Aviation Manufacturers Association</i></span></p> <p>Reference AMC section 5.7 (pg. 44)</p> <p>"IMA module testing".</p> <p>2C153 modules are required to undergo partial qualification, why is additional IMA Module qualification testing defines/required?</p> <p>Please explain the difference between TSO 2C153 qualification and this IMA Module qualification testing, or remove this.</p> <p>Not accepted.</p> <p>ETSO 2C153 is not a mandatory path. Platforms/modules can be developed and qualified independently of EASA 2C153. This is why EASA considers that it is necessary to keep these considerations.</p> <p>A platform/module that has satisfied the 2C153 requirements could reduce/avoid environmental qualification by claiming credit from the ETSOA granted to the article.</p>
comment	<p>146 <span style="float: right;">comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></span></p> <p>Minor comment</p> <p>(AMC 20-170 § 5.2 page 42)</p> <p><b>Comment</b></p> <p>The text for 'parameter data items' calls ED-12C and states that ED-12C should be used in</p>





	<p>that case, even though not the right standard for the certification project.</p> <p>As ‘parameter data items’ is now addressed in ED-12C and AMC 20-115D states what to with parameter data items in case older issues of ED-12 are used (see § 9 of proposed AMC 20-115D in NPA 2017-02), we suggest referencing AMC 20-115, in order to have only one standard referenced for software.</p> <p><b>Proposal</b> We propose rephrasing § 5.2 the following way: "Guidance on IMA configuration data is provided in ED-124 Chapter 3.7.1.1 at the IMA system level and 3.7.1.2 at the application level. These data items are nowadays described as ‘parameter data items’ <del>in ED-12C</del> and should be treated in the same way as other elements of the software. Depending on how a parameter data item is to be used in the IMA system or application, it needs to be defined, managed and documented at the appropriate level (platform, module, application) and to comply with the <del>ED-12C</del> AMC 20-115()<sup>(Note)</sup> guidance, including the process to ensure intermixability and compatibility during the post-TC period as indicated in ED-124. In particular, any parameter data item should be assigned the same software level as the component using it.</p> <p><i><sup>(Note)</sup> Starting from AMC 20-115D"</i></p>
response	<p>Partially accepted.</p> <p>The first occurrence of ED-12C is deemed appropriate and is used in a consistent manner in AMC 20-115D to redirect the reader to the place where the notion of PDI is defined. The text is completed with ‘described as “parameter data items” as defined in ED-12C’.</p> <p>EASA agrees with the second proposal. The text has been modified accordingly.</p>
comment	<p>148                      comment by: <i>ASD - AeroSpace and Defence Industries Association of Europe</i></p> <p>Major comment:</p> <p>(AMC 20-170 § 5.3 pages 42-43)</p> <p><b>Comment</b> The content of this chapter is redundant with other regulatory material. Tool qualification activities are already defined by current AMC 20-115() and ED-80.</p> <p><b>Proposal</b> We propose replacing § 5.3 by the following:</p> <p><b><i>“5.3. Use of tools and the need for qualification</i></b> <i>IMA system development may be supported by the use of tools in order to eliminate, reduce, or automate the software or AEH activities. Tool qualification activities and data are defined in AMC 20-115() and ED-80.”</i></p>
response	<p>Partially accepted.</p>



What EASA targets at in this section are the tools that may be used at system level to support the specific activities related to IMA systems, not the tools that directly fall under the scope of DO-178() and DO-254.

It is also EASA's view that ED-124 Section 5.2.3 needs to be supplemented to link the tool qualification activities with ED-215.

Clarification has been added in Section 5.3.

comment

149

comment by: ASD - AeroSpace and Defence Industries Association of Europe

Minor comment:

(AMC 20-170 § 5.5 page 44)

**Comment**

*"NOTE: A classification scheme should be established in order to assess the OPRs at each level. In order to facilitate the assessment and the communication between stakeholders, the use of a harmonised classification scale is recommended (see, for example, the classification provided in discussion paper DP#9 of ED-94C, Supporting Information for ED-12C and ED-109A)."*

The management of open PR will be soon addressed by a dedicated AMC 20 and associated GM

Consequently, the reference to ED-94C DP#9, will be totally redundant.

**Proposal**

we propose to suppress the reference and to have the following wording : *"NOTE: A classification scheme should be established in order to assess the OPRs at each level. In order to facilitate the assessment and the communication between stakeholders, the use of a harmonised classification scale is recommended"*

response

Accepted.

EASA agrees that this reference should soon be superseded by new EASA material. However, the AMC foreseen to address the topic were not yet finalised at the time of publication of AMC 20-170.

EASA agrees to revise the text without directly referring to ED-94C, as follows:

'NOTE: In order to facilitate the assessment and the communication between stakeholders at each level, the use of a harmonised classification scale for open problem reports is recommended.'

comment

150

comment by: ASD - AeroSpace and Defence Industries Association of Europe

Minor comment:



	(AMC 20-170 § 5.7 page 44)
	<p><b>Comment</b>  <i>“The scope of this section is to provide environmental qualification guidance complementary to ED-124 Chapter 5.2.6 for the environmental qualification of an IMA platform“</i></p> <p><i>“IMA platform”</i> is restrictive: the objective here is not limited to the platform, but addresses the complete IMA system.</p>
	<p><b>Proposal</b>                  Replace in this sentence <i>“IMA platform”</i> by <i>“IMA system”</i>.</p>
response	<p>Accepted.                  EASA agrees with the proposal. The text has been revised accordingly.</p>

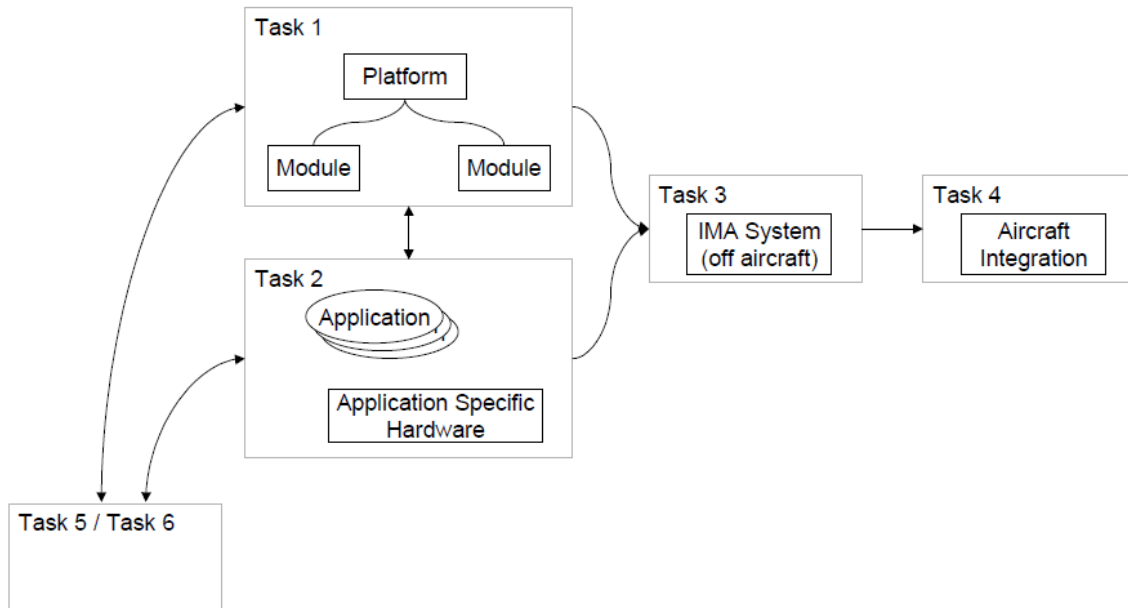
<b>4. Impact assessment (IA)</b>	p. 46-48
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<b>5. Proposed actions to support implementation</b>	p. 49
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comment	147	comment by: <i>Airbus Helicopters</i>
	<p><b>Comment</b>                  EASA indicates that indexes have been created for the lists of current ETSO and all ETSO. However, how to access to these indexes (EASA &amp; you → Aircraft &amp; products → ETSO authorisations) is absolutely not obvious.                  Also, there is still no way to simply identify the current issue of CS-ETSO Subpart A.</p>	
	<p><b>Proposal</b>                  Update the website the following way:</p> <ul style="list-style-type: none"> <li>• Make the access to the ETSO indexes more easy (could be through “Regulations → Initial Airworthiness → CS-ETSO” and through “Document Library → Agency Rules (Soft Law) → Certification Specifications (CSs) → CS-ETSO”),</li> <li>• Add a direct access to the last issue of CS-ETSO Subpart A.</li> </ul>	
response	<p>Noted.                  Starting from CS-ETSO Amendment 12, EASA introduced a new column in the two index tables to clearly identify the CS-ETSO amendment in which each ETSO was published. With this information, the reader will have the possibility to easily retrieve the latest release of each ETSO.                  Nevertheless, these indexes do not provide the information related to the latest amendment of Subpart A. EASA is considering some possibilities to settle this issue; additionally, an Easy Access Rules version of CS-ETSO will be published soon on the EASA website.</p>	



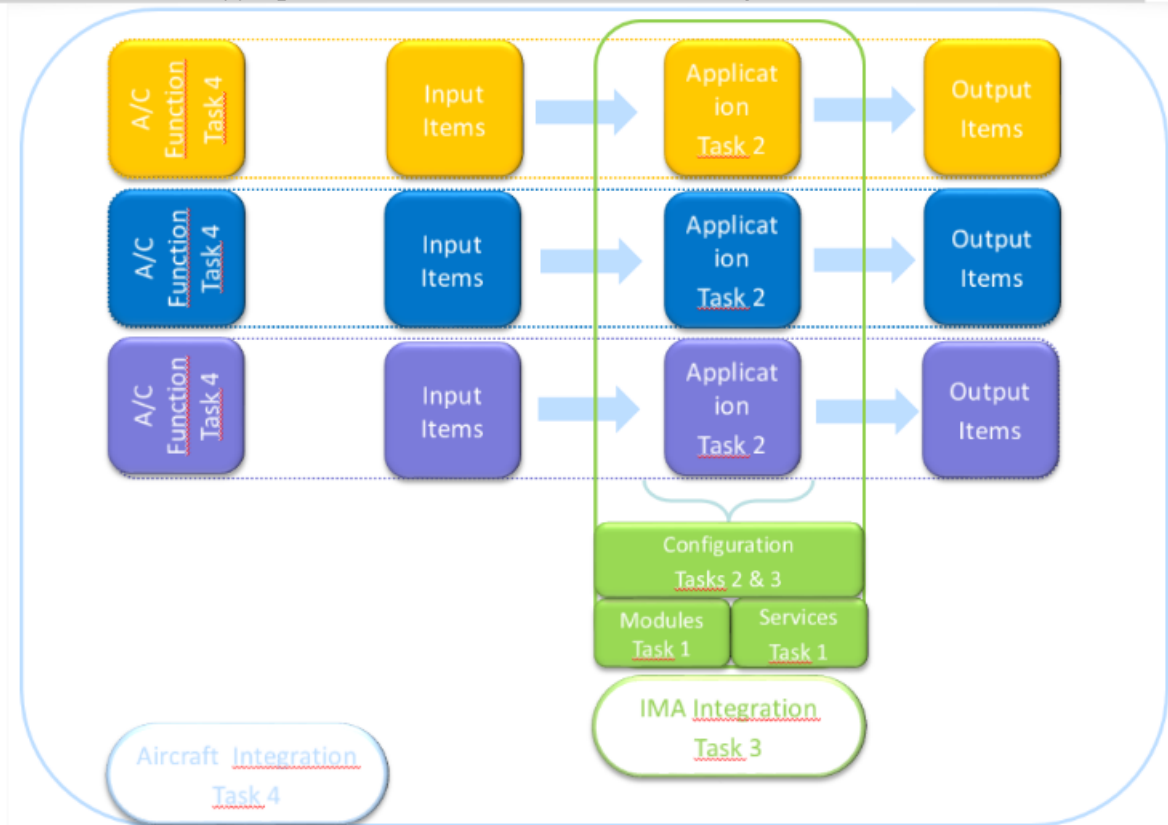
**Appendix A — Attachments**



Attachment #1 to comment [#71](#)



Figure 4 illustrates a mapping between the architecture of an IMA system and Tasks 1 to 4 of ED-124:



Attachment #2 to comment #71