COMMENT RESPONSE DOCUMENT (CRD) TO NOTICE OF PROPOSED AMENDMENT (NPA) 2007-14

for amending the Executive Director Decision No. 2003/10/RM of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for European Technical Standard Orders («CS-ETSO»)

"Systematic review and transposition of existing FAA TSO standards for parts and appliances to be used on civil aircraft into EASA ETSO"

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2007-14, dated 12 September 2007 was to propose an amendment to Decision N° 2003/10/RM of the Executive Director of the European Aviation Safety Agency of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for European Technical Standing Orders (CS-ETSO). The NPA proposed to introduce new ETSO specifications and amended existing ETSO specification that are technically similar to existing Federal Aviation Administration (FAA) TSO.

II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/10/RM was published on the web site (http://www.easa.europa.eu) on 12 September 2007.

   By the closing date of 12 December 2007, the European Aviation Safety Agency (the Agency) had received 32 comments from 12 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

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

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

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

   The resulting text highlights the changes as compared to the current rule.

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

6. Such reactions should be received by the Agency not later than 7 October 2008 and should be submitted using the Comment-Response Tool at http://hub.easa.europa.eu/crt.

IV. CRD table of comments, responses and resulting text

(General Comments) -

comment 18 comment by: *FAA/AVS - AIR120*

This is a generic statement. For all ETSOs that have "Computer section" we would suggest adding a sub-section under the "Computer section" for Complex Hardware and to call out DO-254 for complex hardware. This would then cover design with complex hardware.

response *Accepted*

A sub-section 3.1.4 will be introduced for complex hardware requirements to each ETSO where applicable, referring to Subpart A of CS-ETSO. A new sub-section will be created in Subpart A.

No resulting test will be provided with this CRD as no technical change has occurred.

comment 31 comment by: *UK CAA*

Commentor:
UK CAA
Comment:
The ETSO's within this NPA make reference to DO-160 (ED-14E) for Environmental Standard, and ED-12B for software. This is inconsistent with the other exiting ETSO's, which make reference to CS-ETSO subpart A para 2.1 and 2.2.

response *Noted*

The inconsistency is recognised, but will not be rectified in this revision. The Agency will propose a method for the introduction of revisions to general applicable standards in Subpart A of CS-ETSO that will not result in inconsistencies at individual ETSO level. This however needs public consultation and will therefore be part of a separate rulemaking task.

comment 33 comment by: *DGAC France*

We have no comment on NPA 2007-14

response *Noted*

A. EXPLANATORY NOTE - IV. Content of the draft decision p. 4-6

comment 35 comment by: *Boeing*

Specific section of the proposed document that is of concern:
NPA 2007-14; Section IV, Content of the draft decision; Page 6 of 48

What is EASA's proposed requirement or text?
The NPA states:
"The following new ETSO are introduced based on existing FAA TSO.
...
ETSO-C142a - Non-Rechargeable Lithium Cells and Batteries ...
ETSO-C173 - Nickel-Cadmium and Lead-Acid Batteries ...
ETSO-C174 - Battery Based Emergency Power Unit (BEPU) ...
..."

What about this proposal does Boeing want changed?
NPA 2007-14 introduces six new ETSOs. Three new ETSOs cover the different type of batteries, as indicated above; however, there is another existing FAA TSO for rechargeable lithium cells and batteries that is not currently covered by this NPA. We request that FAA TSO-C179, "Rechargeable Lithium Cells and Lithium Batteries," be added to NPA 2007-14.

Why is the change justified?
Rechargeable lithium cells and lithium batteries are now being used in many aerospace applications. FAA's TSO-C179 that addresses the minimum performance standards for this type of cell and battery was released by the FAA in August 2006. Not all suppliers are aware of the existence of TSO-C179; therefore, some suppliers potentially and incorrectly use the requirements in TSO-C142a for the rechargeable lithium cells and batteries. Since NPA 2007-14 already includes three ETSO for three types of cells and batteries, it would make sense to include TSO-C179 for the rechargeable lithium cells and batteries.

response *Noted*

In order to transpose TSO to CS-ETSO the rulemaking process requires publication of the standard for public consultation. At this stage it is not acceptable to introduce a new standard. Adoption of TSO-C179 will be considered for future rulemaking.

B. DRAFT DECISION p. 8

comment *30* comment by: *Walter Gessky*

The NPA is supported.
Walter Geßky
Austrian Ministry of Transportation, Innovation and Technology

response *Noted*

B. Draft Decision - ETSO-C44c p. 9-10

comment *2* comment by: *FAA/AVS - AIR120*

ETSO is reviewed with no comments.

response *Noted*

B. Draft Decision - ETSO-C44c - Appendix 1 - MPS for FUEL FLOWMETERS p. 11-12

comment	*1*	comment by: *FAA/AVS - AIR120*
	Appendix 1 of ESTO-C44c is reviewed with no comments	
response	*Noted*	

B. Draft Decision - ETSO-C45b p. 13-14

comment	*3*	comment by: *FAA/AVS - AIR120*
	ETSO-C45b is reviewed with no comments.	
response	*Noted*	

B. Draft Decision - ETSO-C45b - Appendix 1 - MPS for MANIFOLD PRESSURE INSTRUMENTS p. 15

comment	*4*	comment by: *FAA/AVS - AIR120*
	Appendix 1 of ETSO-C45b is reviewed with no comments.	
response	*Noted*	

B. Draft Decision - ETSO-C47a p. 16-17

comment	*7*	comment by: *FAA/AVS - AIR120*
	ETSO-C47a is reviewed with no comments.	
response	*Noted*	

B. Draft Decision - ETSO-C47a - Appendix 1 - MPS for PRESSURE INSTRUMENTS - FUEL, OIL and HYDRAULIC p. 18

comment	*8*	comment by: *FAA/AVS - AIR120*
	Appendix 1 of ETSO-C47a is reviewed with no comments.	
response	*Noted*	

B. Draft Decision - ETSO-C56b p. 19-20

comment	*9* comment by: *FAA/AVS - AIR120* ETSO-C56b is reviewed with no comments.
response	*Noted*

B. Draft Decision - ETSO-C121a p. 21-22

comment	*10* comment by: *FAA/AVS - AIR120* ETSO-C121a is reviewed with no comments.
response	*Noted*

B. Draft Decision - ETSO-C142a p. 23-24

comment	*11* comment by: *FAA/AVS - AIR120* For section 3.1.3 under Computer Software, we would suggest adding another section for Complex Hardware. Since DO-178 B is called out, it would also be better to call out DO-254 for complex hardware , if they have it in the design.
response	*Partially accepted* Section 3.1.3 is not applicable to this standard and will be removed. The suggested reference for Complex Hardware is also not considered applicable to this standard, and will therefore not be introduced.

comment	*46* comment by: *duaneq* Artex is a manufacturer of Emergency Locator Transmitters (ELT) since 1990. It has used Lithium Batteries for over ten year in its 406 MHz ELTs. We were the first Avionics manufacturer to receive a FAA TSO C142 for Lithium Batteries. This is simply to explain that we have acquired a fair amount of experience during this time. Artex is in complete agreement that RTCA DO-227 alone is well written and covers the safety aspect of Lithium Batteries adequately. However we taking exception to the additions and changes to RTCA DO-227 contained in the TSO as well as ETSO-C142a are unneeded and in some cases poorly written. Artex Reccomendation: Eliminate the additions and changes to RTCA DO-227 of ETSO-C142a and refer solely to RTCA DO-227 for ETSO requirements and testing.
response	*Not accepted* The aim of this NPA is to harmonise with accepted TSO standards. The service experience is not valid to justify the suppression of the change to RTCA 227 and the commentator has not provided the rationale to change the proposed ETSO-C142a.

resulting text	~~3.1.3 - Computer Software~~ ~~If the article includes a digital computer, develop the software according to EUROCAE~~ ED-12B (RTCA DO-178B), Software Considerations in Airborne Systems and Equipment ~~*Certification, dated December 1, 1992.*~~

B. Draft Decision - ETSO-C142a - Appendix 1 - MPS for LITHIUM BATTERIES p. 25-30

comment	*12* comment by: *FAA/AVS - AIR120* Appendix 1 of ETSO-C142a is reviewed with no comments.
response	*Noted*

comment	*42* comment by: *duaneq* This section adds a number of tests to ensure that a fire within a single cell will not spread to other cells. In order to comply with this requirement Table 2 is added to RTCA DO-227. This table seems to be a redundant to other tests elsewhere in the document. It is very vague in its wording and really doesn't add anything to the overall safety of the battery. The table may have originated from work on re-chargeable Lithium cells and batteries in TSO-C179. Which would make sense since the table seems out of place and the fact that both tables are identical. Artex Recommendation: Eliminate Table 2 that ETSO-C142a adds to RTCA DO-227.
response	*Not accepted* A fire of a lithium cell could result in a catastrophic situation at aircraft level as there is generally no fire protection in the zones where these batteries are installed. As the aim of this NPA is to harmonise with accepted TSO standard the proposed ETSO-C142a will be published for harmonisation with the current TSO.

comment	*43* comment by: *duaneq* This section adds a number of tests to ensure that a fire within a single cell will not spread to other cells. In order to comply with this requirement Table 2 is added to RTCA DO-227. This table seems to be a **redundant to other tests elsewhere in the document**. It is very vague in its wording and really doesn't add anything to the overall safety of the battery. **The table may have originated from work on re-chargeable Lithium cells and batteries in TSO-C179.** Which would make sense since the table seems out of place and the fact that both tables are identical. ***Artex Recommendation:*** ***Eliminate Table 2 that ETSO-C142a adds to RTCA DO-227.***
response	*Not accepted* A fire of a lithium cell could result in a catastrophic situation at aircraft level as there is generally no fire protection in the zones where these batteries are

installed. As the aim of this NPA is to harmonise with accepted TSO standard the proposed ETSO-C142a will be published for harmonisation with the current TSO.

comment

44 comment by: *duaneq*

We reccomend that the Table 2 be eliminated. See comment on previous section.

response

Not accepted

The service experience is not valid to justify the suppression of the change to RTCA 227. Also a fire of a lithium cell could result in a catastrophic situation at aircraft level as there is generally no fire protection in the zone where these batteries are installed. As the aim of this NPA is to harmonise with accepted TSO standard the proposed ETSO-C142a will be published for harmonisation with the current TSO

comment

45 comment by: *duaneq*

ETSO-C142a requirements state the following:
This test is designed to determine the effects of an internal short circuit in undischarged cells. At 24°C, deform the sample between a rod with a hard insulating surface and an insulated plate. Each cell is deformed until the open circuit voltage drops abruptly or is reduced to at least one third. At the point where the cell voltage drops, remove applied force. Allow the sample to cool to 24ºC and then hold for minimum of 24 hours. Examine each sample to determine if it meets the requirements of Table 2-1.

The change from RTCA DO-227 is stated below:
The deformation may be stopped prior to that point (voltage drops) if the sample has been crushed to at least 65% of original thickness and additional samples are tested to produce at least five samples wit the required two thirds voltage drop.

Artex objections:
The purpose of this test as we understand it is an attempt to simulate what would happen if a Lithium Cell developed an internal short-circuit. It has been our experience that cells exposed to the crushing (we have tested various Lithium chemistries from different Cell manufacturers) do not have a voltage drop until the Cell housing is so badly deformed that the safety mechanisms of the Cell is damaged. In a real life installations even during a crash the Cell would never be exposed to a condition where the cells would be crushed to 10% of its original size. Additionally the Department of Transportation (DOT) has eliminated its Internal Short-Circuit test. This DOT test was very similar to the ETSO C142 Internal Short-Circuit Test.

Artex Recommendation:
Eliminate the requirement for Internal Short-Circuit testing.

response

Not accepted

The aim of this NPA is to harmonise with accepted TSO standards. The "internal short circuit test" has not been eliminated by the Department of Transportation (DOT) hence the proposed ETSO-C142a will be published for harmonisation with the current TSO

B. Draft Decision - ETSO-C161 p. 31-32

comment

5 comment by: *FAA/AVS - AIR120*

The proposed ETSO is based on the current FAA TSO. However, the FAA is updating the TSO to reference the updated version of RTCA/DO-253. The updated version clarifies several requirements and changes the interference requirements to ensure compatibility with new GNSS, such as Galileo.

response

Noted

An update to the proposed ETSO will be considered

comment

32 comment by: *UK CAA*

Commentor:
UK CAA
Paragraph:
ETSO-C161
Comment:
EASA is in the final stages of approving GBAS CAT I on the Airbus A380 and has written CRI F-44 for GLS addressing all aspects of the equipment and installation approval.
The NPA 14/2007 includes ETSO-C161, which in turn references RTCA DO-253A. However, if EASA is to mirror the FAA TSO's for GBAS CAT I, it should also consider the following:

1. FAA TSO-C162[1], Ground Based Augmentation System VHF Data Broadcast Equipment (RTCA DO-253A)
2. FAA TSO-C190[2], Active Airborne GNSS Antenna

Note [1]: Within Europe all of the GBAS systems have a VDB with horizontal polarisation. Account should therefore be taken of the applicable VDB antenna standards ensuring interoperability.

Note [2]: It is understood that for GBAS applications an Active Airborne GNSS Antenna is required. Reference to ETSO-C144 within ETSO-C161 is therefore not relevant. Note also that FAA TSO-C144 for the Passive Airborne GNSS Antenna has been superseded by TSO-C144a.
Justification:
Inclusion of ETSO-C161 does not address all of the applicable airborne requirements for GBAS operations.
Proposed Text:
In this package include an ETSO-C162 and ETSO-C190 as also being applicable. Remove reference to ETSO-C144.

response

Partially accepted

New ETSO standards can not be included at this stage of the rulemaking process.

The reference to the antenna standard ETSO-C144 will be removed since it should be considered at installation level of the system.

comment	*40* comment by: *Robert Jeans* I am making these comments as Chairman of Eurocae WG28 which has been working on GBAS standards for several years. However my comments have not been coordinated with the members of the working group and are therefore personal. 1. There are two other relevant TSOs for GBAS: TSO-C162 for the VHF Data Broadcast Equipment (VDB) and TSO-C190 for the active antenna. These also need an ETSO. 2. Section 3.2 references ETSO-C144 (passive antenna). The FAA TSO is now at TSO-C144A, but I'm not sure if there are any significant differences but this should be checked. It is also likely that manufacturers are using active antennas. 3. Section 3.1.1. references DO-253A. This has now been updated to DO-253B and there are some significant differences. TSO-C161 and 162 are expected to be updated to reference DO-253B at some point. I assume that the ETSOs will be kept aligned with the FAA TSOs. 4. The US standards permit the use of vertical polarisation for the airborne VDB antenna and the ground systems will use elliptical polarisation. In Europe the GBAS ground systems will probably use horizontal polarisation only (which is the ICAO standard). This is for frequency planning and cost reasons. There should be some reference or warning to this effect in the ETSO, which should require the use of horizontal polarisation. 5. DO-253 paragraph 1.5.3. references DO246() (LAAS ICD) for the definition of the LAAS (i.e. GBAS) signal-in-space. In Europe we should really reference ICAO Annex 10 as the international standard for the GBAS signal-in-space since this is the standard which the GBAS ground stations will be certified against. Could a note be included in the relevant ETSO (probably ETSO-C162) to this effect. 6. The US standards generally refer to LAAS. It may be useful to have a note stating the equivalence of LAAS and GBAS.
response	*Noted* The Agency recognises that consistency between equipment standards used within systems should be maintained. This will addressed via future rulemaking activities. The proposed ETSO-C161 will be published for harmonisation with the current TSO.

comment	*41* comment by: *Andreas Lipp* Attachment #1 Please see attached document for my comments.
response	*Noted* The Agency recognises that consistency between equipment standards used within systems should be maintained. This will addressed via future rulemaking activities. The proposed ETSO-C161 will be published for harmonisation with the current TSO.

resulting text	3.2 - Specific Regarding the installation procedures and limitations, adequate specification of the interface between the equipment and other systems are mandatory to ensure proper functioning of the integrated system. ~~In particular, one shall refer to ETSO-C144*"Airborne Global Positioning System Antenna" regarding the maximum tolerable currents*and voltages into the antenna.~~

B. Draft Decision - ETSO-C166a p. 33-34

comment	*6* comment by: *FAA/AVS - AIR120* European ANSPs have requested change to this standard to ensure compatibility with future operations in Europe. The FAA has begun accepting equipment designs that comply with the change (details are provided on the FAA regulatory and guidance library website, along with the current TSO). EASA may want to consider updating the standard referenced in the ETSO.
response	*Noted* The Agency notes the comment regarding the requested change. This will addressed via future rulemaking activities. The proposed ETSO-C166a will be published for harmonisation with the current TSO.

B. Draft Decision - ETSO-C173 p. 35-36

comment	*13* comment by: *FAA/AVS - AIR120* ETSO-C173 is reviewed with no comments.
response	*Noted*

B. Draft Decision - ETSO-C174 p. 37-38

comment	*14* comment by: *FAA/AVS - AIR120* ETSO-C174 is reviewed with no comments.
response	*Noted*

B. Draft Decision - ETSO-C174 - Appendix 1 - MPS UNDER STANDARD CONDITIONS p. 39-45

comment	*15* comment by: *FAA/AVS - AIR120* Appendix 1 of ETSO-C174 is reviewed with no comments.
response	*Noted*

B. Draft Decision - ETSO-C175 p. 46

comment	*16* comment by: *FAA/AVS - AIR120* ETSO-C175 is reviewed with no comments.
response	*Noted*

comment	*19* comment by: *Air France - Maintenance Quality Assurance* At the present time, the equipment covered by this ETSO are maintained by organisation that are not necessary Part 145 approved. Covering this equipment with ETSO will have consequences on the maintenance conditions and return to service. This have to be take into account in this proposal and EASA to link with the NPA the conditions of maintenance.
response	*Noted* The existence of equipment standards has no impact on maintenance requirements

comment	*34* comment by: *Driessen Aircraft Interior Systems* Comment 1) In SAE AS 8056, page 16, Figure 1 "Side-by-side - Adjacent loading" there is a note stating "ASSUME NO DIVIDER SUPPORT STRUCTURE". It is our position that there should always be a divider support structure present as part of the galley structure to ensure that the galley equipment (trolley, container) is positioned properly with respect to the galley retainers. By assuming that there is no divider support structure, the strength requirements on the galley equipment is increased in an unrealistic manner as this represents a load case that cannot occur in practice. Please exclude this note. Comment 2) In SAE AS 8056, page 25, section 3.5.2 it is stated that the top surface should comply to the heat release and smoke density requirements of 14 CFR 25.853. When stowed in a galley compartment the top surface of the galley equipment will allways be shielded by the galley compartment and thus the top surface is to be considered as a non-exposed surface. For non-exposed surfaces the heat release and smoke density requirements are not applicable. Please exclude the top surface from the items for which heat release and smoke density substantiation is required.
response	*Not accepted* Comment 1 The specification is considered acceptable since these galley configurations are in service. It cannot be controlled that each galley compartment where a cart or container would be stowed during its in-service live would be provided with a divider support structure. Carts and containers qualified by ETSO-C175 would

be used on various aircraft and thus may be stowed in all kind of galleys or compartments. Thus the side-by-side – adjacent loading has to be complied with.
The requirement is harmonised with the FAA TSO.

Comment 2
Section 3.5.2 of AS8056 contains a provision for cart/container surfaces not meeting 14 CFR 25.853 (Appendix F, Parts IV and V).

The cart or container shall be placarded with stowage instructions per 3.7.1.

Per section 3.7.1 of AS8056, carts or containers shall be placarded with stowage instructions to ensure any surface(s) that does not comply with the heat release and smoke density requirements of 3.5.2 is covered by a compartment wall or door when the cart or container is stowed.

The requirement is harmonised with the FAA TSO.

B. Draft Decision - ETSO-C175 - Appendix 1 - MPS for GALLEY CARTS, CONTAINERS and ASSOCIATED COMPONENTS p. 47-48

comment	*17* comment by: *FAA/AVS - AIR120* Appendix 1 of ETSO-C175 is reviewed with no comments
response	*Noted*

Appendix A - Attachments

Lipp Comments on Draft ETSO-C161.pdf
Attachment #1 to comment #41