



# EASA

European Aviation Safety Agency

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## ETSO-C127 in the EASA system, current and future perspectives

Pasquale Conte  
Parts&Appliances

Enzo Canari  
Cabin Safety

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# ETSOA in the EASA system

- **ETSO Authorization does not represent an installation approval:** the responsibility for installation compliance is of the DOA/Installer.
  - This is explicitly mentioned in the ETSOA “Conditions No.2”.

**Conditions:**

1. The above ETSO Authorisation holder is only authorised to identify an Article with this ETSO marking whilst remaining in compliance with the conditions retained for the Issue of this Authorisation.
2. This ETSO Authorisation does not constitute an installation approval. It is the responsibility of those installing this article to determine that the aircraft installation conditions are within the ETSO standards.

This ETSO Authorisation shall remain valid until surrendered or revoked.

- End -

- DOA/Installer with proper scope of work shall review and approve compliance data according to their EASA approved procedures.



# ETSO-C127a framework in the EASA system

## ➤ ETSO-C127a, CS-ETSO Initial Issue (2003)

### ➤ AS8049A (1997)

- Appendix 1 of ETSO-C127a was addressing applicability of selected AS8049A paragraphs, re-written in some cases to account for specific requirements like flammability, marking provisions, etc.
- *Req. “2.1.4 Compliance with the dynamic impact test pass/fail criteria of Subsections 5.4.3, 5.4.4, and 5.4.9 of SAE AS 8049A for permanent deformation limits, **HIC, and femur loads, respectively, is not required.** However, the data must be reported, as required by subparagraph 5.a(12) of this TSO.”*



# ETSO-C127a framework in the EASA system

- HIC and Femur loads were not ETSO requirements: EASA did not approve showing of compliance to these requirements under the ETSO.
- However, ETSO C127a required that “*data must be collected*”.
- The intent was to prevent repetition of certification tests due to lack of involvement of the installer, running HIC tests with conformed test articles, with Installer/Authority witnessing, producing data that were informally defined as “*good data*” or “*valid test data*”.



- ETSO-C127b was revised in CS-ETSO Amdt. 11 (2016)
  - Selected paragraphs of AS8049B (2005) and ARP5526C (2011) were referenced and, if needed, amended in Appendix 1 of the ETSO
    - Examples of amended paragraphs: Y-belt, stowage compartment, flam. test to FAA PS, deployable items, exclusion of installation angles >18deg, naive subjects testing for life vest retrievability, etc.
    - **Elective Requirements**
      - *Appendix 2 of ETSO par. a) b) c) d) and e)(i.e. HRR Appendix F Part IV and V)*



- Current ETSO-C127b requires meeting additional “occupant injury criteria” and includes elective installation requirements.
- HIC becomes an ETSO requirement:
  - *5.3.9.4 Head Injury Criterion (HIC): Data for determining the HIC need to be collected during the tests discussed in this document only if the ATD's head is exposed to impact on aircraft interior features[...] the maximum value of the **HIC** shall not exceed **1000** for head impact against interior surfaces in a crash.*
- Highly “cabin layout” dependant ETSO-certification exercise.



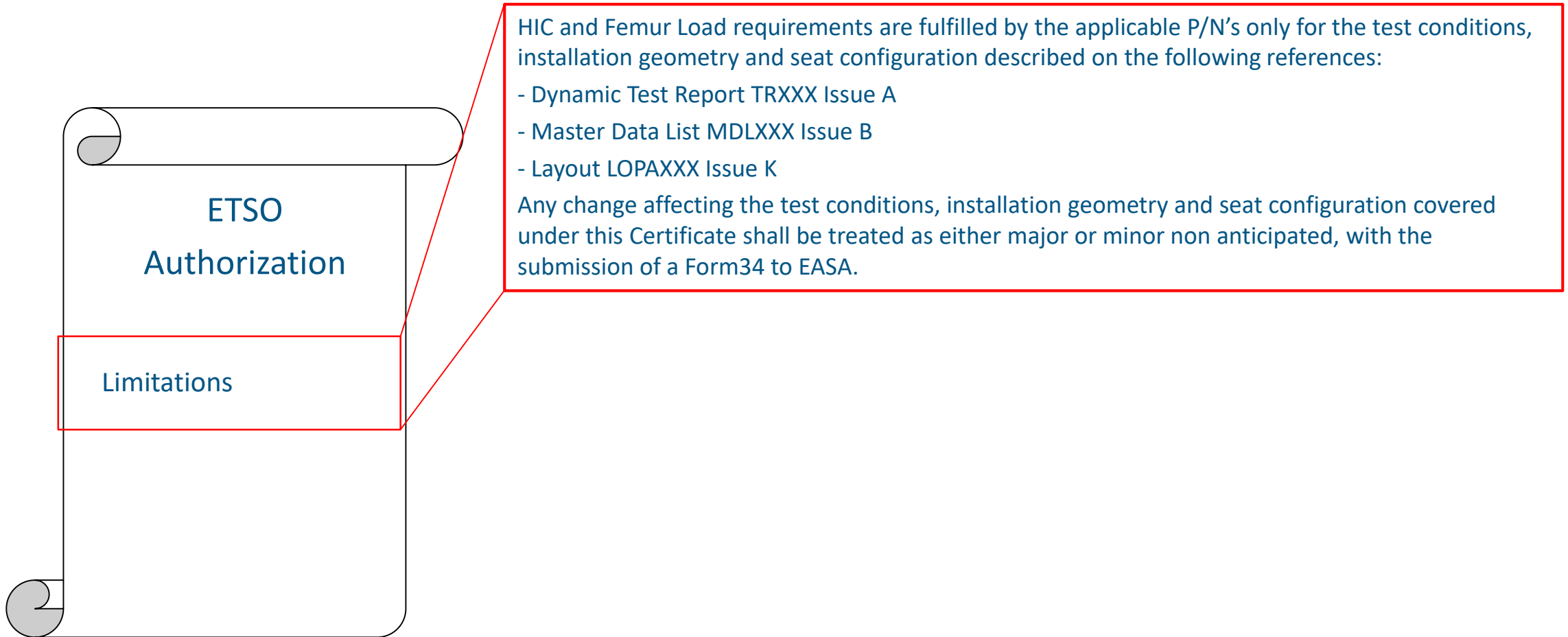
# EASA view of ETSO-C127b approval process

- EASA approves at ETSO level demonstration of compliance and compliance data that could be used to meet installation requirements at aircraft level.
- **Need to define clearly** “what” has been approved during the ETSO certification exercise.
  - The specific set of design data related to seat **installation** are captured currently **via limitations** in the ETSO Authorization.
  - Objective: output from ETSO certification has to be **clear** for the DOA that will then design the installation of the seat.





# EASA view of ETSO-C127b approval process





## Technical challenges due to scope extension

- **Workload:** ETSO certification task is requesting more effort due to the need to:
  - Review HIC test plans and reports
  - Define and documenting installation limitations
- **Classification:** case-by-case discussions on classification of changes, in particular the ones involving the showing of compliance with HIC requirements.
- **Loss of flexibility:** the additional limitations included in the ETSOA significantly reduce the capability to introduce minor changes with respect to the previous ETSO-127a.



Appendix A to GM 21.A.91 provides examples of Major Changes (aircraft level) in the Cabin Safety domain:

- *(i) changes which introduce a new cabin layout of sufficient change to require a re-assessment of emergency evacuation capability or which adversely affect other aspects of passenger or crew safety. Items to consider include, but are not limited to, :*
  - *- changes to or introduction of dynamically tested seats.*
  - *- change to the pitch between seat rows.*
  - *- change of distance between seat and adjacent obstacle like a divider.*
  - *- changes to cabin lay outs that affect evacuation path or access to exits.*



# EASA view of ETSO-C127b approval process

- Generation of HIC compliance data addressing installation requirements for a specific cabin layout (staggered seat installations, exposed armrest configurations, front row HIC) previously discussed by EASA with DOAs in the context of design changes at aircraft level is now managed directly by ETSOH/APDOA in the context of ETSO projects.
- The workload for the EASA specialist involved in the seat installation projects is correspondently reduced.
- In order to find a balance between EASA expectations in terms of Level of Involvement and the ETSO holder need to introduce minor changes to the ETSO-approved articles, it is essential to develop more detailed guidance on classification of changes having an impact on HIC compliance.



# Upcoming ETSO-C127C

- EASA reviewed draft FAA TSO-C127c
  - Technical content address latest developments on seat certification via standards fully agreed by EASA (AS6316 Oblique seats, ARP6199 HRR, AS8049, ARP5526, Neck injury criteria).
  - EASA is in favour of ETSO to TSO technical harmonization.
  - EASA is considering to move some of the new FAA TSO requirements in Appendix 2 (Elective Requirements)
    - EASA will then establish if an APDOA is eligible to comply with elective requirements.
    - Lol will be determined based on performance of the APDOA.



# Upcoming ETSO-C127C

- The classification of changes becomes more critical for TSO-C127C
- Example: oblique seats
  - Any change to the installation limitations could dramatically affect seating system performance in regards to compliance with occupant injury criteria.
  - Given a cabin layout, no detailed guidance exists on the selection of the number and the setup of the critical test cases necessary to meet SAE AS6316 occupant injury criteria.
  - which changes to an oblique seat could be done under a minor change?



- TSO-C127d(?)
  - Following this general trend this might include
    - Certification by Analysis (CBA)
    - Composite Materials in primary structures
    - ...
- Differences in the EASA/FAA systems for the (E)TSO review/approval processes despite harmonized technical contents.
- Need to define criteria for an optimal and balanced LOI in ETSO and installation projects.



- Long term Regulatory update would be necessary
  - EASA APDOA have no privilege to approve minor (non-anticipated) changes.
  - EASA has no delegation process in place for ETSO projects.
  - Level of Involvement (LOI) for ETSO will be basically by default high
  - APDOA does not include a competence assessment of key personnel like for DOA.
  - APDOAs are not audited by EASA on a regular basis.
- The complex scope of the ETSO will lead probably in a revision of Part 21 mandating a **DOA** for ETSO certification projects.





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European Aviation Safety Agency

**Thank you for your attention!**

Any questions?

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