

Deviation Request C90d#2 for an ETSO approval for CS-ETSO applicable to Cargo Pallets, Nets and Containers (Unit Load Devices) (ETSO-C90d)

Consultation Paper

1 Introductory Note

The hereby presented deviation requests shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004 as amended by EASA Management Board [Decision No 12-2007](#) products certification procedure dated 11th September 2007, Article 3 (2.) of which states:

“2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.”

2 Deviation Request

2.1 ETSO-C90d#2 - Cargo Pallets, Nets and Containers (Unit Load Devices)

2.1.1 Summary of Deviation

Deviate from AS36100 Rev. A Section 4.10.4 by using for the container pallet a base edge rail with an EI value lower than the one required.

2.1.2 Original Requirement

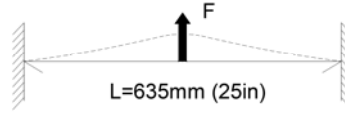
AS36100 Rev. A Section 4.10.4: *All ULD base edges shall have a minimum vertical EI value of $5 \times 10^7 \text{ N.cm}^2$ ($1.75 \times 10^6 \text{ lb.in}^2$).*

2.1.3 Industry

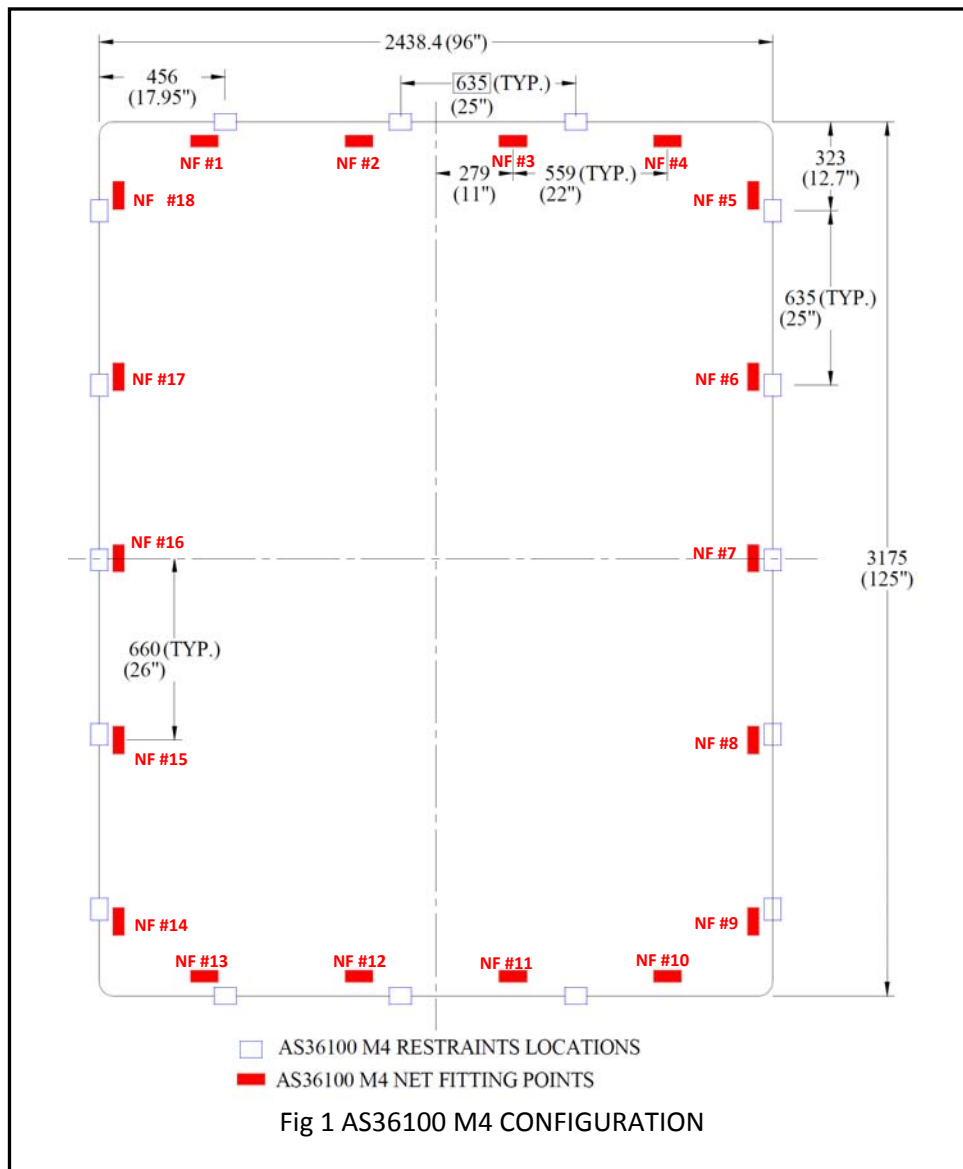
I. Background introduction:

1. The purpose of defining the EI value is to facilitate assessment of aircraft restraint configurations for the concerned ULD by the airframers or CLS designers.
2. The minimum vertical EI value of $5 \times 10^7 \text{ N.cm}^2$ ($1.75 \times 10^6 \text{ lb.in}^2$) is calculated from **UCs A & M upward ultimate load of the PMC pallet**. The computations are as follows:
 - A. The maximum upward load F applied on one fitting is 9400 N (169 000 N ultimate up load of ULD M4 configuration divided by the number of restraints =18, see Fig. 1).

- B. Typical spacing between two restraints $L=635\text{mm}$ (25in) (see NF #3 in Fig. 1).
- C. Deflection Schematic as below:



- D. Assuming the alloy used has a rated 0.2% **yield stress** of $32 \times 10^7 \text{ Pa}$ (N/m^2) or $32\,000 \text{ N/cm}^2$
- E. $I_{\min} = 7.39 \text{ cm}^4$
- F. With E, for typically used alloys, being $7.2 \times 10^6 \text{ N/cm}^2$
- G. $EI_{\min} = 5.32 \times 10^7 \text{ N.cm}^2$ ($1.87 \times 10^6 \text{ lb.in}^2$).
- G. In order to allow for existing variations in actual pallet edge profiles, $EI_{\min} = 5 \times 10^7 \text{ N.cm}^2$ ($1.75 \times 10^6 \text{ lb.in}^2$)



II. Proposed reasons for EI deviations

- A. Since an ULD had already been fully and successfully tested according to AS36100 2K4 Load and Restraint Conditions including UP load test and stacking load test, it is not practical to set another EI value just only to facilitate assessment of aircraft restraint configurations for the airframers or CLS designers because this ULD complied the minimum performance requirements of ETSO C90d AS36100 2K4. Any party wants to use it beyond the scope of AS36100 load and restraint conditions should get their own approval from their authority unless there is new change/ revision of 2K4 load and restraint conditions.
- B. From the calculation of Section 2.1.3 I (2), it is based on “M” size load and restraint conditions of the pallets but whether it could be used as a universal EI requirement for all other ULDs should be further discussed. For example, AS36100 Restraint Condition “L” has only two restraints at the short sides but only stoppers (no vertical restraints) at the long sides which could result in more critical conditions as the aspect of EI calculation.
- C. From the calculation of Section 2.1.3 I (2), it was calculated when there is a double fitting with ultimate upward load acting between two restraints of a pallet and set $5 \times 10^7 \text{ N.cm}^2$ as the final EI value. But for 2K4 load and restraint condition, **there is no upward load or restraint for the front base edge rail**. In this condition, the calculation from “M” size configuration could not reflect the real situation and is not applicable for 2K4 AKE containers.

2.1.4 Equivalent Level of Safety

The computing of new EI value requirement in AS36100 Rev. A is based on “M” size configuration but for different types ULDs, they should be further discussed. The required UP load test requirement of both NAS3610 and AS36100 remained unchanged for “K” size container and NAS3610 2K configuration has already been fully verified for its safe usage for decades. Except the EI value that is originally intended to be the reference for the airframers or CLS, once the ULD had been physically tested of all the ultimate load conditions of AS36100A 2K4, it could have the equivalent level of safety with deviation of EI value of the front base edge rail.

2.1.5 EASA position

We accept the deviation.