

Initial Airworthiness

UKTSO Deviations

**UKTSO Deviation – UK.ETSO-C90dA1.DEV.001 –
Use of Minimum Performance Standards SAE
AS36100C and AS36102B in Place of SAE AS36100A
and AS36102A**

Proposed: ☐ Final ☒



1. Introductory Note

The UK CAA has received the following request for Deviation to a CS-ETSO requirement in accordance with the provisions of Part 21.A.610.

In accordance with the UK CAA Design and Certification procedures, such deviation requests shall be assessed by the authority and be subject to a period of public consultation of not less than 3 weeks except if they have been previously agreed and published by the UK CAA.

All interested persons may send their comments referencing this Deviation Proposal number to the email address Certification.Airworthiness@caa.co.uk. The consultation period closed on 21 October 2022.

The final decision is published by the UK CAA.

2. UK.ETSO-C90dA1.Dev.001 Cargo Pallets, Nets and Containers (Unit Load Devices)

2.1 Summary of Deviation

Deviate from ETSO-C90d A1 and SAE AS36100A and AS36102 by using the minimum performance standards and the test method defined in SAE AS36100C and AS36102B respectively.

2.2 Original Requirements

ETSO-C90d A1 Section 3 Technical Conditions, Subsection 3.1.1 Minimum Performance Standard "[...] For new models of Type II ULDs standards set forth in the Society of Automotive Engineers, Inc. (SAE) Aerospace Standard (AS) 36100, 'Air Cargo Unit Load Devices - Performance Requirements and Test Parameters', Revision A, dated April 2006. For Type I and II ULDs, the standards set forth in SAE AS36102, Air Cargo Unit Load Devices - Testing Methods, dated March 2005 are applicable."

2.3 Industry

In ETSO-C90d A1, the minimum performance standards are set forth in AS36100A, 'Air Cargo Unit Load Devices- Performance Requirements and Test Parameters'. Within AS36100A clause 4.10.3.4 defines a strength requirement for all track type tie-down receptacles in the pallet construction. It specifies a minimum load capacity of 8900N (2000 pounds) in all directions, horizontal to vertical. This is ambiguous for two reasons:

- a) The method of load application is not specified. It could be with a single or a double stud tiedown – or even with a completely different fitting,
- b) It refers to a performance requirement in all directions horizontal to vertical. 'All' can be an infinite number of directions and is not prescriptive of a testing schedule. See Figure 1 below.

Consultation Paper Deviation UK.ETSO-C90dA1.DEV.001, Issue 1

Proposed: ☐ Final ☒**4.10.3 Pallets and Nets**

- 4.10.3.1 If a pallet (or net) is to be substantiated individually, a qualified net (or pallet) of the same configuration code may be assumed for analysis or used for test. A qualified and compatible net (or pallet) of different configuration code may be used for testing, provided that it equals or exceeds ultimate strength requirements of the pallet (or net) being substantiated. For substantiating a net, any net tensioning devices shall be engaged; a pallet needs not be used for testing, provided that all net fittings are at the locations specified in the unit load device configuration.
- 4.10.3.2 Pallet edge tracks and net fittings shall conform to the geometric and tolerance requirements of AS33601 or ISO 7166 or, for double stud fittings, ISO 9788, or equivalent with at least equal ultimate strength.
- 4.10.3.3 All net fittings incorporating a single tie-down stud for attachment to pallets shall have a minimum ultimate load capacity of 8900 N (2000 pounds) in all directions, horizontal to vertical. Double stud tie-down fittings shall have a minimum ultimate load capacity of 17,800 N (4000 pounds) in all directions, horizontal to vertical. The load application point shall be 21 mm (0.83 inches) or less from the head end of the stud.
- 4.10.3.4 Except where otherwise stated, all track-type tie down receptacles incorporated in the pallet construction shall have a minimum ultimate load capacity of 8900 N (2000 pounds) in all directions, horizontal to vertical. The load application point shall be 23 mm (0.90 inches) or more from the bottom of the track groove.
- 4.10.3.5 Pallet/net tie down fittings, other than stud and track type fittings, shall have a minimum ultimate load capacity of 8900 N (2000 pounds) in all directions, horizontal to vertical.

Figure 1 - AS36100A, strength requirements clause 4.10.3 for pallets and nets

A suitable test methodology is required to demonstrate compliance with clause 4.10.3.3. This is not defined in SAE AS36102, despite being referenced as an applicable test method.

Revision B of SAE AS36102 includes section 4.3.6. Track Test; this was not included in the previous revision of the standard. This section outlines a procedure for demonstrating compliance of the track type tie-down receptacles of the ULD (Figure 2).

4.3.6 Track Test

The following test shall be conducted to demonstrate the pallet track's capability to ensure cargo restraint through means such as TSO-C172 restraint straps or restraint slings with an ultimate load rating of 22.25 kN (5000 lbf), in accordance with AS36100B paragraph 4.10.3.5.

- 4.3.6.1 A 23.0 kN $\pm$ 1.0 kN (5200 lbf $\pm$ 200 lbf) force shall be applied to the track in the upward direction through a double stud fitting meeting the geometry and performance requirements of ISO 9788, at the locations specified in 4.3.6.2 or 4.3.6.3 as appropriate to the pallet size,
- 4.3.6.2 Pallet sizes G and R shall be restrained in their AS36100 restraint configuration (side restraint for both sizes). One test shall be performed with a fitting located in the center of the pallet's 2438 mm (96 inches) side. Another test shall be performed with a fitting located mid way between two restraints on the pallet's long side (see Appendix B, Figure B4). Where the pallet type has an optional vertical track, the tests shall be repeated at the same locations on this vertical track. As an alternative to using a full pallet, a cut out section of the pallet according to the stapled line in Figure B4 is allowable, providing all restraint dimensions are observed.

Figure 2 - AS36102B, Section 4.3.6 Track Test

Thus, using AS36102B as a means to demonstrate compliance with C90d, and AS36100C 4.10.3.5, there is now a clearly defined testing procedure with a load value of 22.25kN (5000lb) and a clearly defined load direction of 'upwards'.

Consultation Paper Deviation UK.ETSO-C90dA1.DEV.001, Issue 1

Proposed: ☐ Final ☒

2.4 Equivalent Level of Safety

Revision C of AS36100 and revision B of SAE AS36102 represent updated versions of the industry standard and are commonly regarded to be an improvement in certification of ULDs. There is now a higher minimum strength value of the pallet track tie-down receptacles (22.25kN compared with 8.9kN). Hence there is at least the same level of safety than the previous revisions.

In addition, FAA TSO-C90e (effective date 6th July 2021), 'Section 3. Requirements define AS36100C and AS36102B as the applicable technical documents to support compliance. It is anticipated that the CAA/EASA will adopt the changes contained in FAA TSO C90e in due course, so the deviation reflects the latest requirements of TSO C90e and the latest requirements of the SAE AGE-2 committee.

2.5 UK CAA position

The UK CAA accepts the deviation.