

**Air Cargo Unit Load Devices – Reference Documents**

**RATIONALE**

This Aerospace Information Report was prepared in order to provide users with a comprehensive bibliography of the standards and recommendations applying to air cargo Unit Load Devices (ULD).

Revision A updates the references with new standards, regulations and revisions published since its inception in 2005.

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## 1. SCOPE

### 1.1 Purpose

- 1.1.1 The present Aerospace Information Report (AIR) provides a list of the main government regulations, SAE and international standards, and standing industry recommendations applying to air cargo unit load devices (pallets, nets and containers) to be loaded with either baggage or freight on board civil transport aircraft.
- 1.1.2 It is intended to provide unit load devices designers, purchasers and operators as well as civil transport aircraft and aircraft cargo systems designers within the industry with a list of the available document references to cover the other aspects that do not all directly pertain to airworthiness and testing, listed in clause 1.1, Purpose, of AS36100A, Air Cargo Unit Load Devices - Performance Requirements and Test Parameters [TSO-C90d].
- 1.1.3 The scope of the listed documents covers airworthiness and continued airworthiness requirements, design and testing methods, design specifications, unit load devices accessories, and the main published rules for their proper operation/utilization and operating staff training.

### 1.2 Field of Application

- 1.2.1 This Aerospace Information Report (AIR) is intended to apply to all airworthiness approved (certified) general purpose air cargo unit load devices. However, in addition:
- 1.2.2 Many provisions of the listed documents equally apply to non-airworthiness approved (non-certified) units. Users are invited to review them and take them into account for design and operation of such units,
- 1.2.3 Special purpose air cargo unit load devices are subject to all pertinent provisions of the listed documents insofar as their general unit load device function is concerned. They often also require purpose specific features and performances: the relevant industry guidance documents are listed herein when available, but they usually define only basic characteristics or requirements that necessitate further expert know-how.
- 1.2.4 This Aerospace Information Report (AIR) does not address the mandatory or optional character of the listed documents, and does not take responsibility for determining it. It pertains to document users under their responsibilities to determine which of the listed documents, or which of their contents, constitute mandatory requirements (except airworthiness approval requirements for certified units, always mandatory), or to identify equivalent alternate means and validate them to the satisfaction of the approval Authority and/or the purchaser.
- 1.2.5 The reference documents listed in this Aerospace Information Report (AIR) are not intended for use on military transport aircraft. Nothing, however, precludes their being used for guidelines in this case, it pertaining to the military operator to identify and implement any additional applicable criteria.

## 2. REFERENCES

### 2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

In many instances, identical or closely similar documents are published by several industry sources, principally including ISO International Standards, IATA (Unit Load Devices Technical Manual), and SAE. In order to facilitate their identification, those documents addressing the same subject are listed together under a same item. See 2.1.1 in the event of a conflict arising between their contents.

### 2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

- Aerospace Standards (AS)
- Aerospace Recommended Practices (ARP)
- Aerospace Information Reports (AIR).
- Aerospace Material Specification (AMS).

NOTE: No revision number is indicated. Check the latest published revision number on the SAE web site.

### 2.1.2 AIA Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, [www.aia-aerospace.org](http://www.aia-aerospace.org).

### 2.1.3 European Union Publications

Available from European Aviation Safety Agency, Postfach 10 12 53, D-50452 Koeln, Germany, Tel: +49-221-8999-000, [www.easa.europa.eu](http://www.easa.europa.eu).

### 2.1.4 IATA Publications

Available from International Air Transport Association, Publications Assistant, 800 Place Victoria, P.O. Box 113, Montreal, Quebec H4Z 1M1, Canada, Tel: 1-514-874-0202, [www.iata.org](http://www.iata.org).

IATA standard specifications concerning air cargo unit load devices are published in the IATA Unit Load Devices Technical Manual (UTM).

### 2.1.5 U.S. Government Publications

Available from the United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-0000, [www.gpoaccess.gov](http://www.gpoaccess.gov).

### 2.1.6 International Standards

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, [www.ansi.org](http://www.ansi.org).

or

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, [www.iso.org](http://www.iso.org).

or

any of the national Standards Institutes worldwide, Members of ISO.

## 2.2 Terms and Definitions

For the purposes of the present AIR and listed documents, the following terms and definitions apply unless otherwise defined in the document:

**CIVIL TRANSPORT AIRCRAFT:** An aircraft operated for civil commercial transport of passengers or freight, and capable of carrying air cargo unit load devices for baggage or freight.

**CONTAINER (AIR CARGO—):** A rigid structure which interfaces directly with the aircraft cargo handling and restraint system and alone performs all the functions of a unit load device.

**INSTALLATION:** The fact of installing a unit load device for flight into an aircraft's cargo compartment and restraint system.

**NET (AIR CARGO PALLET—):** A webbing or rope net for restraining load onto an air cargo pallet.

**PALLET (AIR CARGO—):** A unit load device consisting of a flat platform with flat undersurface of standard dimensions, on which goods are assembled and secured by a net before being loaded as a unit onto the aircraft, and which interfaces directly with the aircraft handling and restraint system.

**RESTRAINT SYSTEM:** Equipment for supporting and restraining unit load devices in an aircraft against the ground/flight loads. It usually consists of such items as rollers, side guides and locks for securing unit load devices to the aircraft structure. It does not include unit load devices, barrier nets and tie-down straps.

**UNIT LOAD DEVICE (ULD):** Device for grouping, transferring and restraining cargo for transit. It may consist of a pallet with a net or it may be a container.

**UTILIZATION:** All actions pertaining to operational use of a unit load device, including inspection, build-up, securing, ground transport, loading, and installation aboard aircraft.

## 3. ULD AIRWORTHINESS REQUIREMENTS

- [1] Code of Federal Regulations Title 14 CFR ( FAR ) Part 21 - Certification Procedures for Products and Parts, Subpart O - Technical Standard Order Authorizations,

European Aviation Safety Agency CS-ETSO, Certification Specifications for European Technical Standard Orders.

- [2] FAA Technical Standard Order (TSO) C90d - Cargo Pallets, Nets and Containers,

European Technical Standard Order (ETSO) C90d - Cargo Pallets, Nets and Containers.

- [3] Code of Federal Regulations Title 14 CFR Part 25, Airworthiness Standards: Transport Category Airplanes, European Aviation Safety Agency CS-25, Certification Specifications for Large Aeroplanes.

- [4] AIA National Aerospace Standard NAS 3610, Cargo unit load devices - Specification for — [Revision 10, 1990, TSO C90c]

ISO 8097, Aircraft - Minimum airworthiness requirements and test conditions for certified air cargo unit load devices [4th edition, 2001, ETSO C90c].

NOTE: ISO 8097 4<sup>th</sup> edition contains the corrections to erroneous data still contained in NAS 3610 revision 10.

- [5] SAE Aerospace Standard AS36100A, Air Cargo Unit Load Devices — Performance Requirements and Testing Parameters [TSO-C90d].

ISO 21100, Air cargo unit load devices — Performance requirements and testing parameters [ETSO-C90d].

SAE Aerospace Information Report AIR36106A, Air Cargo Unit Load Devices – Use of Airworthiness Reference Documents

NOTE: AIR36106A also contains guidance as to proper use of NAS 3610, item [4].

#### 4. ULD GENERAL DESIGN AND TESTING

- [6] SAE Aerospace Standard AS33601, Track and Stud Fitting for Cargo Transport Aircraft, Standard Dimensions for — [formerly published as MS33601B],

ISO 7166, Aircraft — Rail and stud configuration,

IATA UTM Standard Specification 50/0, Appendix B, MS 33601A track and stud.

- [7] SAE Aerospace Standard AS36101, Air Cargo Unit Load Devices - Load Distribution Model.

- [8] SAE Aerospace Standard AS36102, Air Cargo Unit Load Devices - Test Methods.

- [9] ISO 11242, Aircraft — Pressure equalization requirements for cargo containers,

IATA UTM Standard Specification 80/2, Pressure equalization requirements for aircraft and shipping containers.

- [10] SAE Aerospace Information report AIR1490, Environmental Degradation of Textiles,

ISO Technical Report TR 8647, Environmental degradation of textiles used in air cargo restraint.

- [11] SAE Aerospace Standard AS1825, Methodology of Calculating Aircraft Cargo Volumes,

ISO 10046 — Aircraft - Methodology of calculating cargo volumes,

IATA UTM Standard Specification 50/0, Appendixes D and E, Maximum allowable ULD contours.

#### 5. ULD TYPES DESIGN SPECIFICATIONS:

- [12] SAE Aerospace Standard AS832, Air/Surface (Intermodal) General Purpose Containers,

ISO 8323, Freight containers — Air/surface (intermodal) general purpose containers — Specifications and tests,

IATA UTM Standard Specification 50/6, Air/surface (intermodal) container.

- [13] SAE Aerospace Standard AS1130, Air and Air/Surface (Platform) Cargo Pallets,

ISO 4117, Air and air/land cargo pallets — Specification and testing,

IATA UTM Standard Specification 50/9, 16' or 20' pallet for NAS 3610 class II restraint system.

- [14] SAE Aerospace Standard AS1131, Air and Air/Surface (Platform) Cargo Pallet Nets,

ISO 4115, Air cargo equipment — Air/land pallet nets,

IATA UTM Standard Specification 50/2, Aircraft pallet net.

- [15] SAE Aerospace Standard AS1491, Interline Air Cargo Pallets,

ISO 4171, Air cargo equipment — Interline pallets,

IATA UTM Standard Specification 50/1, Pallet for NAS 3610 class II restraint system,

- [16] SAE Aerospace Standard AS1492, Interline Air Cargo Pallet Nets,  
ISO 4170, Air cargo equipment — Interline pallet nets,  
IATA UTM Standard Specification 50/2, Aircraft pallet net.
- [17] SAE Aerospace Standard AS1677, General Requirements for Noncertified Cargo/Baggage Containers,  
ISO 4118, Non-certified lower deck containers for air transport — Specification and testing,  
IATA UTM Standard Specification 50/7, General specification for non-certified aircraft container.  
NOTE: See 1.2.2 above.
- [18] SAE Aerospace Standard AS4041, Air Mode General Purpose Containers,  
ISO 4128, Aircraft — Air mode modular containers,
- [19] SAE Aerospace Standard AS5896, Certified Lower Deck Containers for Wide-body/High-capacity Aircraft,  
ISO 6517, Air cargo equipment — Base restrained certified containers exclusively for the lower deck of high-capacity aircraft,  
IATA UTM Standard Specification 50/4, Certified aircraft container.
- [20] ISO 10327, Aircraft - Certified aircraft container for air cargo — Specification and testing,  
IATA UTM Standard Specification 50/4, Certified aircraft container.
6. ULD ACCESSORIES
- [21] ISO 9788, Air cargo equipment — Cast component of double-stud fitting assembly with a load capacity of 22 250 N (5 000 lbf) for aircraft cargo restraint.
- [22] ISO 12118, Air cargo equipment — Identification of double-stud tie-down fittings having an omni directional rated load capacity of 22 250 N (5 000 lbf) or above.
- [23] SAE Aerospace Standard AS5385C, Cargo Restraint Straps - Design Criteria and Testing Requirements [TSO-C172],  
ISO 16049-1, Air cargo equipment — Restraint straps — Part 1: Design criteria and testing methods [ETSO-C172],  
IATA UTM Standard Specification 60/2, Air cargo restraint strap.
- [24] SAE Aerospace Standard AS6554, Cargo Stopper Devices.
- [25] SAE Aerospace Recommended Practice ARP1988, Cargo Pallet Extenders,  
IATA UTM Standard Specification 60/1, Pallet extensions.
- [26] IATA UTM Standard Specification 50/3, Functional specification for non-structural igloo.
- [27] ISO 14186, Air cargo – Fire containment covers – Design, performance and testing requirements [in preparation]