



AEROSPACE INFORMATION REPORT

AIR36106™**REV. A**

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Superseding AIR36106

Air Cargo Unit Load Devices - Use of Airworthiness Reference Documents

RATIONALE

AIR36106A has been reaffirmed to comply with the SAE five-year review policy.

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1. SCOPE

1.1 Purpose

- 1.1.1 This SAE Aerospace Information Report (AIR) provides instructions for intended proper use of Aerospace Standard AS36100A, published 2006-04 [TSO pending], as the technical reference for airworthiness approval of air cargo unit load devices (pallets, nets and containers) to be loaded on board civil transport aircraft. For consistency and cross-checking purposes, it also includes instructions for proper use of previous NAS 3610 [Revision 10, 1990, referenced in TSO C90c], as commonly understood by the industry.
- 1.1.2 This AIR does not provide detailed background or rationale for the technical contents of AS36100A, which are separately provided in AIR36108, AS36100A background and development record.
- 1.1.3 AS36100A exclusively defines the general geometric parameters (insofar as they affect restraint on board aircraft), minimum performance requirements and testing parameters of unit load devices. Additional areas as per AS36100A paragraph 1.1, such as continued airworthiness and maintenance requirements, design and testing methods, unit load devices design specifications and accessories, and rules for proper operation/utilization and operating staff training also need to be considered for designing unit load devices, and are covered by other documents, listed in AIR36105A.

1.2 Field of Application

- 1.2.1 This AIR is intended to provide AS36100A users including Airworthiness Authorities, unit load devices designers, purchasers and operators as well as civil transport aircraft and aircraft cargo systems designers within the industry, with a single agreed method for using AS36100A to determine applicable airworthiness requirements.
- 1.2.2 In the same way, it is intended to provide them with the commonly understood though more complex method for using NAS 3610 [Revision 10, 1990, referenced in TSO C90c], to determine the airworthiness requirements applicable to unit load devices approved or to be approved under TSO C90c (e.g., because their size or type are not covered in AS36100A).

2. REFERENCES

2.1 Reference Documents

The publications listed herein were duly taken into consideration when developing AS36100A and this AIR. When referring to them, the latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of publication of AS36100A (2006-04) or its latest revision. Nothing in these documents, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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.

ARP1334	Ground Equipment Requirements for Compatibility with Aircraft Unit Load Devices
AS1825	Methodology of Calculating Aircraft Cargo Volumes
AS33601	Track and Stud Fitting for Cargo Transport Aircraft, Standard Dimensions for
AS36100A	Air Cargo Unit Load Devices - Performance Requirements and Test Parameters
AS36101	Air Cargo Unit Load Devices - Load Distribution Model

AS36102	Air Cargo Unit Load Devices - Testing Methods
ARP36103	Air Cargo Unit Load Devices - Center of Gravity Control Methods
ARP36104A	Air Cargo Pallets and Nets Compatibility
AIR36105A	Air Cargo Unit Load Devices - Reference Standards
AIR36108	AS36100 Background and Development Record

NOTE: Where no revision letter is indicated, check the latest published revision number on the SAE web site. Numerous other unit load device related SAE documents may also be concerned: see AIR36105A.

2.1.2 U.S. Government Publications

Available from U.S. Government Printing Office, Mail Stop SSOP, Washington DC 20402-9325, www.gpoaccess.gov/ecfr and the FAA website www.airweb.faa.gov/rql.

Title 14 CFR (FAR) Part 21 - Certification Procedures for Products and Parts, Subpart O - Technical Standard Order Authorizations

FAA Technical Standard Order (TSO) C90, Cargo Pallets, Nets and Containers

Title 14 CFR (FAR) Part 25 - Airworthiness Standards: Transport Category Airplanes

2.1.3 European Union Publications

Available from European Aviation Safety Agency (EASA), Otto Platz 1, Köln Deutz, Postfach 101253, D-50452 Cologne, Germany, Tel. +49-221-8999-000, www.easa.eu.int

EASA CS-ETSO, Certification Specifications for European Technical Standard Orders

European Technical Standard Order (ETSO) C90, Cargo Pallets, Nets and Containers

EASA CS-25, Certification Specifications for Large Aeroplanes

2.1.4 AIA Publications

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

NAS 3610 Cargo unit load devices - Specification for - [Revision 10, 1990, referenced by TSO C90c]

2.1.5 International Standards

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org, or 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, or any of the national Standards Institutes worldwide, Members of ISO.

ISO 4116	Air cargo equipment - Ground equipment requirements for compatibility with aircraft unit load devices
ISO 7166	Aircraft - Rail and stud configuration
ISO 8097	Aircraft - Minimum airworthiness requirements and test conditions for certified air cargo unit load devices [4th edition, 2001, referenced by ETSO C90c]

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
ISO 10046	Aircraft - Methodology of calculating cargo compartments volume
ISO 11242	Aircraft - Pressure equalization requirements for cargo containers
ISO 21100	Air cargo unit load devices - Performance requirements and testing parameters [in preparation, ETSO pending]

2.1.6 IATA Standards

IATA Standard Specifications concerning air cargo unit load devices are published in the IATA Unit Load Devices Technical Manual (UTM), available from the 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.

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, type certificated under 14CFR Part 25 or EASA CS-25, 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.

TYPE 1 ULD: A unit load device designed for use in an approved aircraft restraint system that conforms to all flight and ground cargo restraint and occupant protection requirements of Title 14 CFR Part 25, including the 9.0g forward ultimate inertia force of § 25.561 (b)(3)(ii).

TYPE 2 ULD: A unit load device designed for use in an approved aircraft cargo compartment and restraint system that conforms to the flight and ground cargo restraint and occupant protection requirements of Title 14 CFR Part 25, except for the 9.0g forward ultimate inertia force of § 25.561 (b)(3)(ii), which is complied with either by supplementary installation of a barrier net or bulkhead, or by specifying an approved placement of the ULD in the aircraft.

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. GENERAL

3.1 Unit Load Devices

- 3.1.1 The purpose of using AS36100A or NAS 3610 is to determine performance requirements and test parameters for airworthiness approval of a unit load device (container, pallet net or pallet).
- 3.1.2 This process is independent from the aircraft type(s) the unit load device is to be carried on. It only determines ultimate load capabilities under defined restraint conditions, for airworthiness approval under a ULD configuration of Technical Standard Order TSO C90. The aircraft parameters (structural requirements, certified flight envelope load factors in each direction, actual restraint system) determine the maximum allowable capability of a ULD with a given TSO configuration code at a given position in the aircraft. This is published for the operators in the Authority approved Weight and Balance Manual (WBM) for the aircraft type or sub-type concerned, that controls ULD utilization.

NOTE: The approved Weight and Balance Manual may be issued by either:

- the aircraft Type Certificate (TC) owner, usually the aircraft's manufacturer, or
- a Supplemental Type Certificate (STC) holder.

In either case, it defines the Authority approved methods and parameters of installation of unit load devices on board the aircraft, and shall be systematically referred to and complied with.

- 3.1.3 Only Type 2 ULDs of the most commonly used sizes are specified in AS36100A (see § 4). Type 1 ULDs, commonly referred to as "9 g", and other sizes are specified only in NAS 3610 [Revision 10, 1990, referenced by TSO C90c] (see Section 5).

3.2 Aircraft Restraint Systems

- 3.2.1 AS36100A or NAS 3610 are not intended or suitable for the purpose of designing aircraft unit load devices restraint systems or defining the sole requirements there for. Particularly, the restraint conditions (RCs) shown in these documents (e.g., Section 8 of AS36100A) do not intend to represent actual aircraft restraint cases, but to define a uniform ultimate load capability assessment system for the unit load devices themselves, regardless of the aircraft restraint system's actual geometry.
- 3.2.2 However, any aircraft restraint systems for civil transport aircraft - unless intended for special purposes - should be designed to be capable of restraining unit load devices TSO C90 approved in accordance with either of these airworthiness reference documents.
- 3.2.3 Accordingly, AS36100A or NAS 3610 ULD restraint conditions are intended only for testing or analyzing the ultimate load performance of the ULDs. The capability for the same TSO approved ULD within a given actual aircraft restraint system must be derived from that established performance level, taking into account the differences with the reference ULD testing condition.