



AEROSPACE STANDARD

AS4041**REV. B**

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Superseding AS4041A

Air Mode General Purposes Containers

RATIONALE

The SAE AGE-2A committee determined that the technology/practice defined in this standard has reached a level of maturity such that it is unlikely to change in the foreseeable future; therefore, it does not require regular 5-year reviews by the committee and it is appropriate for it to be stabilized.

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This document has been declared "Stabilized" by the SAE AGE-2A Cargo Handling Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. SCOPE:

- 1.1 This SAE Aerospace Standard (AS) establishes the basic requirements for the design, construction and testing of air mode 2.44 m X 2.44 m (8 ft X 8 ft) cross-section containers.

These containers are to be used exclusively in conjunction with the air mode in freighter versions of wide-body commercial transport aircraft. Air mode containers will normally be on aircraft roller conveying systems and/or on similarly equipped ancillary ground handling devices. Similar requirements for air/surface (intermodal) containers are provided in AS832.

2. REFERENCES:

2.1 Applicable Documents:

- 2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS832	Air/Surface (Intermodal) General Purpose Containers
ARP1334	Ground Equipment Requirements for Compatibility with Aircraft Unit Load Devices
ARP1372	Minimum Requirements for Air Cargo Unit Load Device, Ground Handling and Transport Systems

- 2.1.2 NAS Publications: Available from Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

NAS 3610	Cargo Unit Load Devices, Specification for. Aerospace Industries Association of America, Inc., 1725 DeSales Street N.W., Washington, DC 20036
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- 2.1.3 FAR Publications: Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591.

Federal Aviation Regulation (FAR) Part 25, United States Department of Transportation

Technical Standard Order TSO-C90

- 2.1.4 ANSI Publications: Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

Federal Test Method Standard No. 406, Plastics - Methods of Testing - Method 1091: Abrasion wear (loss in weight)

ISO 6346 Freight Containers, Coding, Identification and Marking

ISO 11242 Aircraft-Pressure Equalization Requirements for Cargo Containers

- 2.1.5 IATA Publications: Available from International Air Transport Association, 2000 Peel Street, Montreal, Quebec, Canada H3A 2R4.

IATA Standard Specification Number 50/0, Condition Requirements for Interlining of ULDs

IATA Standard Specification Number 40/0, Marking of Unit Load Devices

IATA Standard Specification Number 40/1, IATA Identification Code for Unit Load Devices

IATA Standard Specification Number 50/6, Air/Surface (Intermodal) Container

IATA Standard Specification Number 80/2, Press Equilization Requirements for Aircraft and Shipping Containers

2.2 Definitions:

AIR MODE CONTAINER: An article of transport equipment having an internal volume of 14 m³ (500 ft³) or more, with restraint provisions compatible with an aircraft restraint system and an entirely flush base bottom to allow handling on rollerized cargo handling systems.

MAXIMUM GROSS WEIGHT, MGW: The maximum allowable combined weight of the container and its cargo.

TARE WEIGHT, T: The weight of the empty container, including its normal complement of loading restraint devices.

2.3 Terminology:

The term "Weight" is used throughout this aerospace standard instead of the correct technical term "Mass" in order to conform to current commercial usage.

The essential basic and detail criteria are identified by use of the key word "shall." Recommended basic and detail criteria are identified by use of the key word "should," and, while not mandatory, are considered to be of primary importance in providing serviceable, economical and practical air mode containers.

3. TECHNICAL REQUIREMENTS:

3.1 General:

It should be noted that Appendices A, B, C, D, and E also form part of the requirements of this section. In addition, IATA Standard Specification No. 50/0 should be referred to for general requirements beyond the scope of this document (e.g., serviceability limits).

3.1.1 **Airworthiness:** The airworthiness requirements laid down by the Federal Aviation Administration, FAR Part 25, and supplementary document TSO-C90 are the governing requirements for container design. Airworthiness design criteria provided in this document dealing with ultimate loads, center of gravity limits, pressure equalization and fire protection requirements are provided for reference purposes only and are based on the FARs in effect at the time of this revision. Specific design guidelines to meet the pressure equalization requirements of the FARs are based on ISO 11242.

3.1.2 **Tare Weight:** Taking into consideration the unique aircraft requirements, container design should utilize the combination of design and material which results in as low a tare weight as possible.

3.1.3 **Customs Sealing:** Since air mode containers are expected to travel on international routes under customs control, container design shall meet the appropriate requirements of the following international conventions:

- a. UN/IMO (International Maritime Organization): Customs convention on containers, Geneva, 1972-12-02
- b. UN/ECE (Economic Commission for Europe): Customs convention on the international transport of goods under cover of TIR carnets (TIR Convention), Geneva, 1975-11-14

The main items from the above international conventions to be taken into consideration for container design appear in A.5 of Appendix A. Also, in accordance with Annex 5 of the convention quoted in (a), and with Annex 3 of the convention quoted in (b), an approval certificate should be issued by competent national authority, and an approval plate as specified (minimum dimension 200 mm x 100 mm (8 in x 4 in) should be affixed accordingly in the vicinity of the lower edge of the container door.

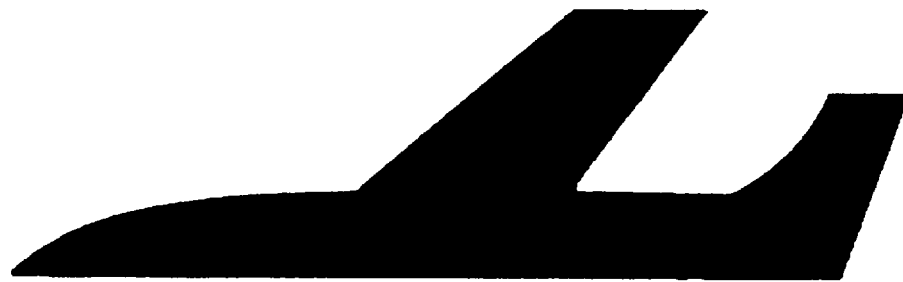
3.1.4 **Symbols and Marking:** To denote the container as an air mode (8 ft x 8 ft) container, the symbol illustrated in Figure 1 shall be used and located at the top left-hand corner of the end walls and sidewalls and, as appropriate, on the roof. Overall identification and marking of the containers shall be in accordance with IATA 4010 and 4011. These requirements are presented in Appendix C.

NOTE: If any other markings are used on the container, they shall in no way interfere with the location of the markings required by IATA 40/0 (Section 4) and IATA 40/1.

3.2 Dimensions and Tolerances:

3.2.1 **External Dimensions:** The overall external dimensions and tolerances of the containers covered by this aerospace standard are shown in Appendix B. No part of the container shall project beyond these specified overall external dimensions.

3.2.2 **Minimum Internal Dimensions:** The internal dimensions of the containers shall be as large as possible but at least equal to those values shown in Appendix B.



AIR ONLY



NOTES:

1. To denote that the container is an air mode container incapable of being stacked, the above shall be used.
2. The aircraft symbol shall be at least 130 mm (5 in) high and 360 mm (14 in) long. The no stacking symbol shall be at least 280 mm (11 in) high and 260 mm (10 in) wide. The recommended proportions should be used. The capital letters shall be at least 80 mm (3 in) high.
3. The color of the symbol should be red. If the color of the container is such that the symbol does not show clearly, a panel of a suitable color, preferably white, should be provided as background.

FIGURE 1 - Symbol to Denote Air Mode Container

- 3.2.3 Door Opening: The container shall be designed to make the maximum possible internal cross-section available for loading.

Each container shall be provided with a door opening at least at one end.

Door openings shall be as large as possible, but not less than:

- a. Minimum door height: 2134 mm (84 in)
- b. Minimum door width: 2286 mm (90 in)

3.3 Load Ratings:

For the ratings of containers suitable for air transport, the following definitions apply.

- 3.3.1 Maximum Gross Weight Rating, Ra and Load Distribution: The container shall not be used at gross weights in excess of those given in Table 1.

TABLE 1 - Maximum Gross Weight of Container, Ra

Container Designation	Maximum Gross Weight Ra	Maximum Gross Weight Ra
	kg	lb
1A	20 412	45 000
1B	15 876	35 000
1C	11 340	25 000
1D	5 670	12 500

A uniformly distributed load up to 6759 kg (14 900 lb) may be used over a 3 m (10 ft) linear length for 1A, 1B and 1C containers.

- 3.3.2 Center of Gravity: Cargo placement shall limit the center of gravity to within the envelope indicated below:

- a. $\pm 10\%$ of the external lateral width, measured from the geometric center
- b. $\pm 5\%$ of the external longitudinal length, measured from the geometric center
- c. Between a height of 356 mm (14 in) to 1 219 mm (48 in), measured from the bottom of the base

To obtain the asymmetric conditions, cargo density shall be assumed to vary linearly.

3.4 Structural Requirements:

NOTE: Also refer to Appendix A for supplementary structural requirements.

3.4.1 Ground Handling:

- 3.4.1.1 Bridging and Cresting: The container shall be capable of negotiating a crest or bridge when being moved along a rollerized conveyor system, without suffering permanent deformation or damage (see 4.7 - Test No. 6).
- 3.4.1.2 Roof Strength (Walking Loads): The container roof shall be capable of withstanding a uniformly distributed load of not less than 300 daN (660 lb), over an area of 600 mm x 300 mm (24 in x 12 in), applied vertically downwards (see 4.4.2 - Test No. 3.1).
- 3.4.1.3 Base Restraint On Roller Bed Vehicles: Slots to be used for ground transport restraint on roller bed vehicles shall be provided, as shown in Figure 2. The inner face of each outward slot (or block) shall be capable of restraining, laterally, 33% of the maximum gross weight (Ra).

The container lower edge member shall be capable of restraining an upward load of 20% of the maximum gross weight (Ra) in the slot area. These loads shall be applied simultaneously (see 4.8 - Test No. 7).

- 3.4.1.4 Ground Transport Equipment: The applicable portions of ARP1372 shall be considered for handling of the container.

- 3.4.2 Aircraft Restraint Loads: The container shall be designed to bear the ultimate loads given in NAS 3610 (see Appendix D) while on a minimum roller system per 3.5.2.6, with the base restrained in accordance with 3.4.2.1 and 3.4.2.2, and with the center of gravity of the cargo located at any point in the envelope specified in 3.3.2.

Under these loads, the container may exhibit permanent deformation, but it shall not break up to the extent of discharging cargo.

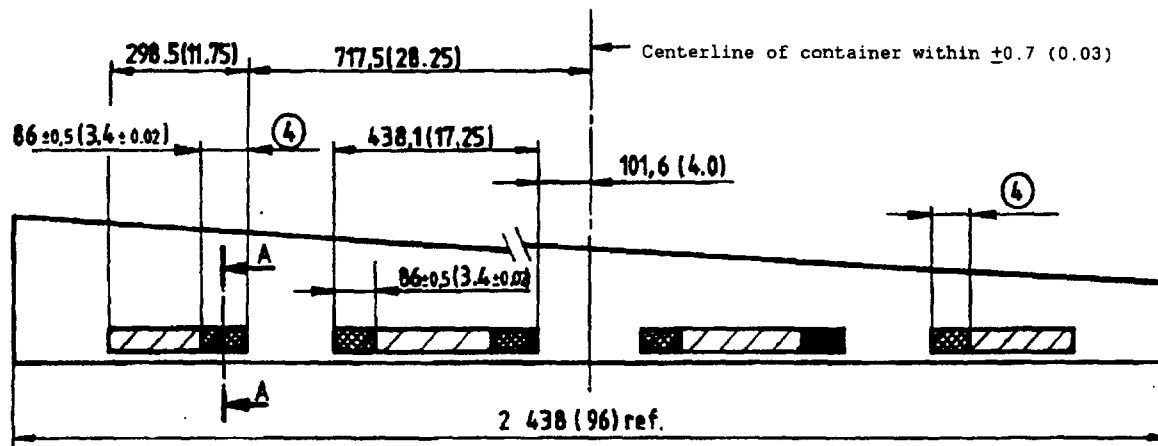
- 3.4.2.1 Base Restraint Loads: Side loads shall be exerted on the container base. Upward, forward, and aft loads shall be exerted by a fitting, as shown in Figure 3, inserted into the restraint slots, as shown in Figures 4 and 5. The design shall allow the forward and aft loads to be exerted on the following number of load-bearing slots:

- a. 1 A (40 ft) container: 11 slots
- b. 1 B (30 ft) container: 8 slots
- c. 1 C (20 ft) container: 5 slots
- d. 1 D (10 ft) container: 2 slots

The ultimate forward and aft load capability of each slot shall be 8340 daN (18 750 lb), imparted by a restraint latch as shown in Figure 3, acting on the abutment face.

The container shall be designed to be restrained by vertical loads exerted by 50 to 60% of the total number of slots, equally distributed on each side. The upward load shall be exerted by a minimum fitting, as shown in Figure 3, inserted in the side restraint slots (see 4.2.2, 4.2.3, 4.3.2, 4.3.3, 4.4.3 and 4.4.4).

Dimensions in millimeters
(Dimensions in inches in parentheses)



A-A

For the cross-section, see
Figure 3 side slot detail

NOTES

1. Slots are indicated thus: 
2. Optional slot sizes are indicated thus: 
3. Tolerance: ±0.7 (±0.03), unless otherwise stated.
- ④ (Refer to the illustration) Slots to be used for ground transport restraint. The area shown shall be kept clear for aircraft and ground equipment latch interface.

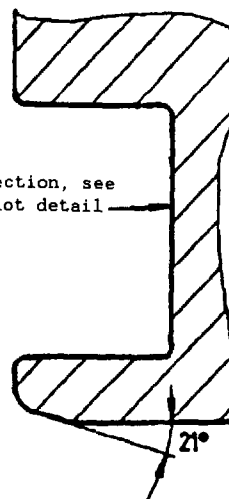


FIGURE 2 - End Slots

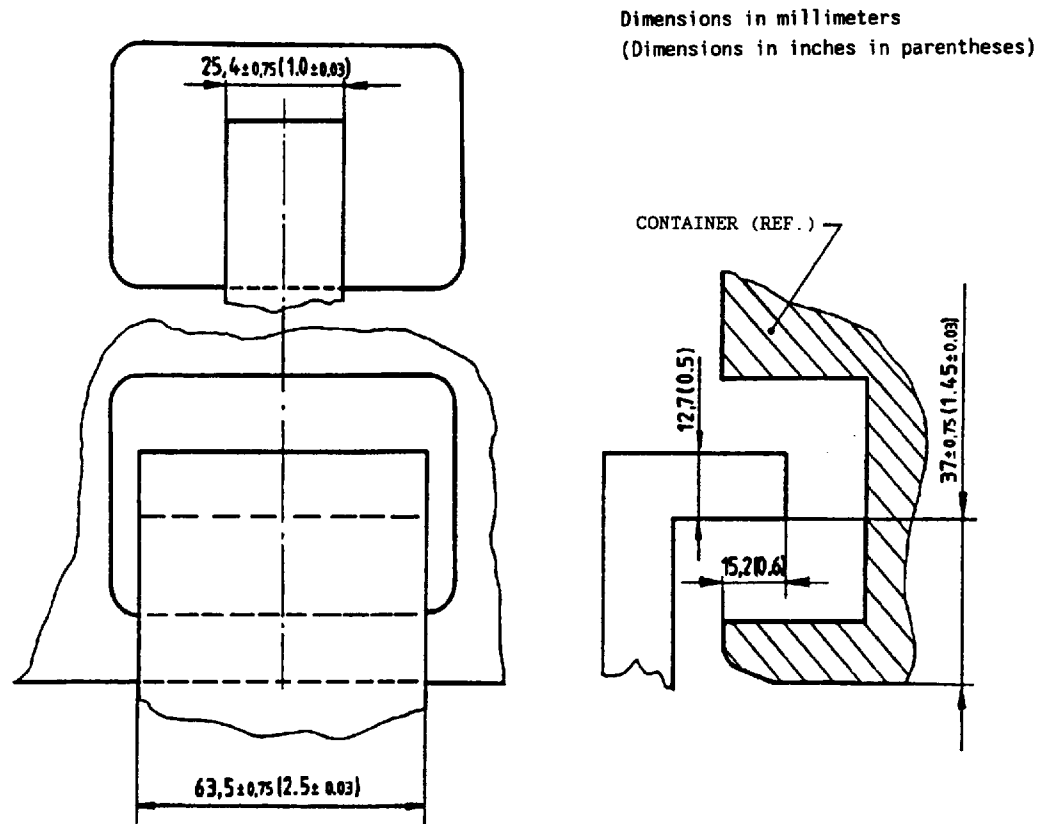


FIGURE 3 - Latch Dimensions

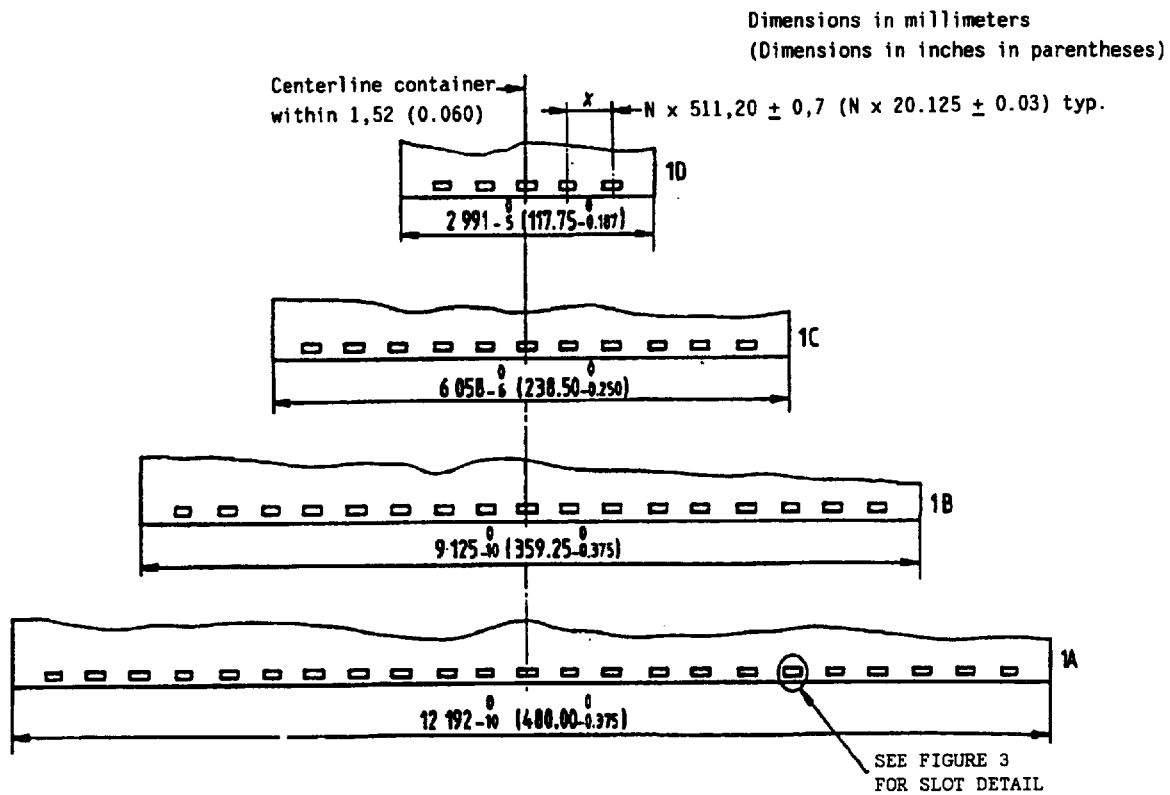


FIGURE 4 - Side Restraint Slots Location

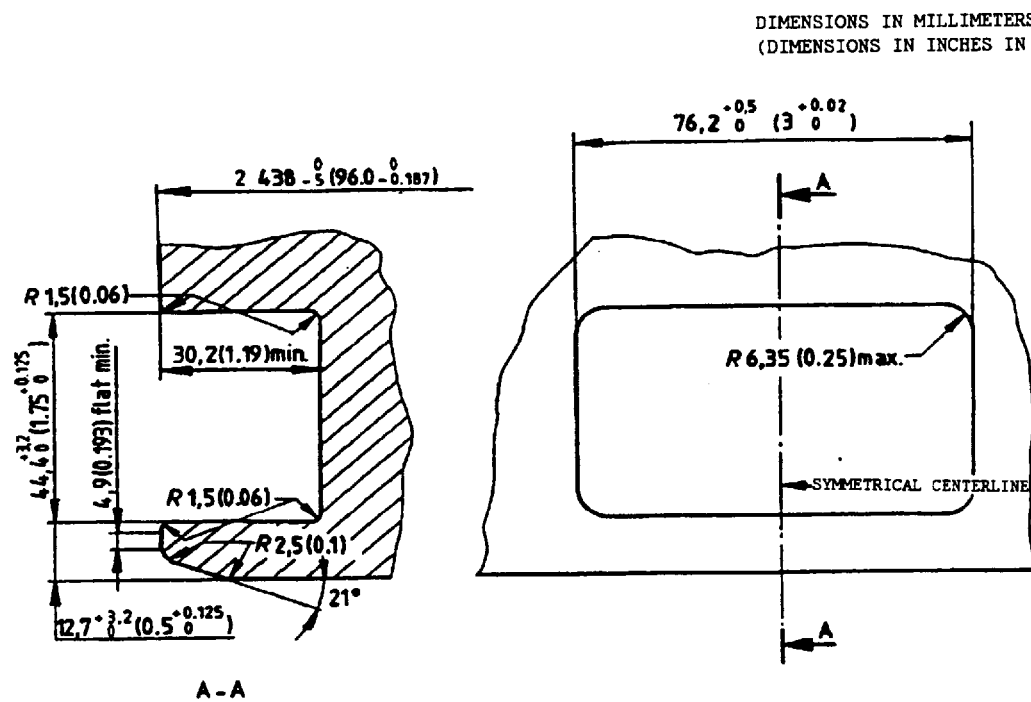


FIGURE 5 - Side Slot Detail