
International Standard



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Aircraft — Air mode modular containers

Aéronefs — Conteneurs pour le fret aérien

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Foreword

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International Standard ISO 4128 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

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Aircraft — Air mode modular containers

0 Introduction

This International Standard specifies dimensional, structural and environmental requirements for 2,44 m × 2,44 m (8 ft × 8 ft) cross-section containers to be used in freighter versions of high-capacity fixed-wing aircraft.

NOTE — For the purposes of this International Standard, the minimum essential criteria are identified by use of the key word "shall". Recommended 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 transport containers. Deviation from recommended criteria shall occur only after careful consideration, extensive testing and thorough service evaluation have shown alternative methods to be satisfactory.

1 Scope and field of application

1.1 This International Standard lays down the dimensions and specifies the basic requirements for the specification and testing of containers to be used exclusively in conjunction with the air mode in freighter versions of high-capacity fixed-wing aircraft.

1.2 The containers will have nominal dimensions of 2,44 m × 2,44 m (8 ft × 8 ft) cross-sections and lengths of 3, 6, 9 and 12 m (10, 20, 30 and 40 ft).

1.3 Air mode containers will normally be on aircraft equivalent roller conveying systems and/or on similarly equipped ancillary ground handling devices.

1.4 Containers suitable for fully air/surface (intermodal) handling are specified in ISO 8323.

2 References

ISO 6346, *Freight containers — Coding, identification and marking*.

ISO 8097, *Aircraft — Minimum air worthiness requirements and test conditions for certified air cargo unit load devices*.¹⁾

ISO 8323, *Freight containers — Air/surface (intermodal) general purpose containers — Specification and tests*.²⁾

United States Federal Test Method Standard No. 406, *Plastics — Methods of testing — Method 1091 : Abrasion wear (loss in weight)*.³⁾

3 Basic requirements

3.1 Dimensions

External dimensions and minimum internal volume and door opening shall be as shown in table 1. Diagonal tolerances shall be as specified in table 2.

Table 1 — External dimensions, internal volume and door opening

Overall length		Overall width		Overall height		Minimum door width		Minimum door height		Minimum internal volume	
mm	in	mm	in	mm	in	mm	in	mm	in	m ³	ft ³
12 192 ⁰ ₋₁₀	480 ⁰ _{-0.375}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 286	90	2 134	84	59,189	2 090
9 125 ⁰ ₋₁₀	359.25 ⁰ _{-0.375}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 286	90	2 134	84	44,179	1 560
6 058 ⁰ ₋₆	238.50 ⁰ _{-0.25}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 286	90	2 134	84	29,453	1 040
2 991 ⁰ ₋₅	117.75 ⁰ _{-0.187}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 438 ⁰ ₋₅	96 ⁰ _{-0.187}	2 286	90	2 134	84	13,877	490

1) *De facto* NAS 3610.

2) At present at the stage of draft.

3) This reference will be replaced by an ISO reference when an International Standard on the subject is available. In the meantime the American Standard can be obtained, without charge, from : United States General Services Administration, 18th and F Streets, N.W., Washington, DC 20405, USA.

Table 2 — Diagonal tolerances (see figure 3)

Overall length		K_1 max. ¹⁾		K_2 max. ²⁾	
mm	in	mm	in	mm	in
12 192	480	19	0.75	12,7	0.50
9 125	359.25	9,5	0.375	12,7	0.50
6 058	238.50	14,3	0.563	12,7	0.50
2 991	117.75	12,7	0.50	12,7	0.50

1) $K_1 = D_1 - D_2$ or $D_2 - D_1$ or $D_3 - D_4$ or $D_4 - D_3$

2) $K_2 = D_5 - D_6$ or $D_6 - D_5$

3.2 Construction

3.2.1 Body or box

3.2.1.1 Body construction shall be rugged, weather-tight, minimizing maintenance and original cost by having the doors, latches and locks as the only moving parts.

3.2.1.2 All fittings and attachments shall be within the maximum external dimensions of the container (see table 1).

3.2.1.2.1 Mating devices that support, transfer, position and secure containers shall be provided by transportation carriers, transferring equipment or terminal facilities.

3.2.1.3 Container construction shall have sufficient structural strength to withstand, without permanent deformation, the static and dynamic loads and the impact shock and racking stresses encountered in normal carrier service.

3.2.1.4 At least a total of 77,4 cm² (12 in²) of vent area for each 3 048 mm (10 ft) length, or fraction thereof, of container shall be provided for pressure equalization.

3.2.1.4.1 This vent shall be adequately protected from cargo load shift to ensure that no less than 77,4 cm²/3 048 mm (12 in²/10 ft) is available during emergency operation.

3.2.1.5 The container roof shall withstand, without permanent deformation, a down load of 294 daN (660 lb) applied to any 305 mm × 610 mm (12 in × 24 in) area.

3.2.2 Base

3.2.2.1 The bottom surface of the base shall be flat and continuous.

3.2.2.1.1 For the length of the container, the bottom surface shall be flat to within 1,6 mm (0.062 5 in). This shall allow for a waviness factor, crest to crest, at a minimum pitch of 914 mm (36 in).

3.2.2.2 No structure shall protrude below the bottom surface of the base.

3.2.2.3 Construction

3.2.2.3.1 The base shall have a nominal thickness of 50,8 mm (2 in) from the bottom surface. This thickness may be varied when the base design employed results in a lighter and more durable structure capable of accepting uniform loading of 1 916 daN/m² (400 lb/ft²) when supported on the conveying system described in 3.2.2.3.5.

3.2.2.3.2 The base shall be enclosed on all four sides by an edge member conforming to figures 4, 5 and 6. The vertical surface of the container base between the restraint provisions, shown in figures 4 and 5, shall be smooth and continuous so as to provide an automatically latching aircraft restraint system interface.

The base bottom skin should be enclosed by its edge member. The bottom surface shall be flush with the edge member. The lower edge of the edge members shall be as shown in figure 5. The base corners shall be a 76,2 mm (3 in) radius in the plane of the panel. Corners should be readily replaceable or shall be repairable.

3.2.2.3.3 The base should be structurally attached to the body by means of a minimum number of fittings which shall be easily removable and interchangeable.

3.2.2.3.4 So that the container conforms to the aircraft system deflected shape, the 9 m (30 ft) or 12 m (40 ft) long container bases, when loaded to the rated gross weight load shown in 3.3.1, shall be free to deflect ± 9,5 mm (± 0.375 in), without rigid restraint by the side walls. Base stiffness in the forward and aft direction in the plane of the base shall not exceed 338,954 N·m²/m (3 × 10⁶ lb·in²/in).

These 9 m (30 ft) and 12 m (40 ft) container requirements relate to present-day aircraft and may be relaxed for future aircraft.

3.2.2.3.5 The base design shall provide for support and ease of movement at the rated distributed load on the following minimum conveyor systems:

- Four rows of rollers, approximately equally spaced over a minimum width of 1 930 mm (76 in) measured between

centres. Each row comprises 38 mm (1.5 in) diameter rollers, 76 mm (3 in) long, uncrowned, with an edge radius of 1,5 mm (0.06 in), spaced on 254 mm (10 in) centres. The container travels perpendicularly to the roller centrelines.

- Swivel castors, with 25,4 mm (1 in) diameter wheels, having a contact length of 50,8 mm (2 in), located on a 305 mm × 305 mm (12 in × 12 in) grid pattern. The container travel is in all directions across the grid.

- Ball transfer units, with 25,4 mm (1 in) diameter balls, located on a 127 mm × 127 mm (5 in × 5 in) grid pattern. The container travel is in all directions across the grid.

For design purposes, it may be assumed that while supported on these systems and being transported over the road, the container will be subjected to vertical loads of approximately 1,8g (dynamic) with a frequency of 180 cycles/min and an amplitude of 76 mm (3 in).

3.2.2.3.6 The base shall comply with the following conditions :

- ball indentation in accordance with 4.2;
- ball castors in accordance with 4.3;
- abrasion in accordance with 4.4;
- base strength in accordance with 5.4.4.

3.2.3 Aircraft restraint provision

Restraint provision as shown in figures 4, 5 and 6 shall be provided.

3.2.4 Doors

3.2.4.1 The container shall be designed to make maximum possible internal cross-section available for loading (see table 1).

3.2.4.2 It should be possible for one man to open and close the door in no more than 30 s.

3.2.4.3 The lower edge of the door shall not encroach on the restraint slot area shown in figure 6.

3.2.4.4 The door should have the minimum number of position latches and restraint attachments that will withstand the ultimate load (see 3.4.2) without unlatching or releasing the container contents.

3.2.4.4.1 Latches shall be located so that they cannot damage or be damaged by adjacent units should they inadvertently be left open or come open in flight.

3.2.4.4.2 No tools should be required to open or close the doors or latches.

3.2.4.4.3 The door latches and installation mechanisms should be designed to allow the opening and shutting of the door while the container is on uneven surfaces that vary up to 12,7 mm (0.5 in) over the width of the door opening.

3.2.4.4.4 Means should be provided to give mechanical indication that the door is positively locked.

3.2.4.5 Door assemblies and components should be interchangeable.

3.2.4.6 It should be possible to lock (in order to discourage entry) and seal the door so that there shall be some visual indication of unauthorized entry.

3.2.4.7 Particular design attention should be given to preventing water from leaking through door-to-body interface areas.

3.2.4.8 Handles, straps or handholds shall be provided on the door on the 3 m (10 ft) container to assist manual movement of the container.

3.2.4.8.1 These devices should withstand a 445 daN (1 000 lb) pull in any direction.

3.2.4.8.2 They should provide an area equivalent to 152 mm wide by 76 mm deep (6 in × 3 in).

3.2.5 Complete assembly

3.2.5.1 The container shall be capable of traversing a 2° (0,034 rad) crest or valley with no permanent deformation or damage.

3.2.5.1.1 To meet this condition, containers uniformly loaded to gross weight shall be capable of being supported at the cresting point through a roller contact of 2 032 mm (80 in) minimum width on a roller with a maximum diameter of 38 mm (1.5 in).

3.2.5.2 There shall be provision for "D" rings or equivalent, each capable of reacting a 2 225 daN (4 000 lb) operating load, applied in any direction, and spaced at approximately 610 mm (24 in) centres around the internal periphery of the container.

3.2.5.3 In order to prevent tampering or pilferage of shipments moving under customs control (TIR), a sealing system shall be used and shall be positioned so that the sealing unit will be held firmly in place when the seal is affixed.

3.2.5.3.1 Doors shall be fitted with a device to permit simple effective customs sealing. This device shall either be welded in the sides of doors or secured by at least two bolts, rivetted or welded to the nuts on the inside.

3.2.5.3.2 Hinges shall be made and fitted so that doors, once shut, cannot be lifted off the hinge pins. Screws, bolts, hinge pins or other fasteners shall be welded to the outer parts of the hinges, unless the closure system has locking devices, inaccessible from the outside, which, when applied, prevent the doors from being lifted off the hinge pins.