# International Standard 4118

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# Non-certified lower deck containers for air transport — Specification and testing

*Conteneurs non certifiés de soutes inférieures d'aéronefs de grande capacité — Spécification et essais*

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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4118 was developed by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, and was circulated to the member bodies in November 1977.

It has been approved by the member bodies of the following countries :

| | | |
|---|---|---|
| Australia | Germany, F.R. | South Africa, Rep. of |
| Austria | India | Spain |
| Belgium | Italy | Turkey |
| Brazil | Japan | USA |
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Czechoslovakia
United Kingdom





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# Non-certified lower deck containers for air transport — Specification and testing

## 0 Introduction

The basic function of the container is to unitize and contain its load during ground handling and air transportation.

## 1 Scope and field of application

This International Standard specifies the general design, performance and testing requirements for compartment restrained lower deck aircraft unit load devices which do not require airworthiness certification. Supplementary requirements will be found in the appropriate annexes.

### 1.1 Basic container sizes

The various container sizes are shown in the appropriate annexes, viz :

Annex A : Half width contoured container 2 006,6 mm (79 in) with base dimensions 1 534 mm × 1 562 mm (60.4 in × 61.5 in).

Annex B : Half width rectangular container with base dimensions 1 534 mm × 1 562 mm (60.4 × 61.5 in).

Annex C : Full width rectangular container with base dimensions 1 534 mm × 3 175 mm (60.4 in × 125 in).

### 1.2 Basic container configuration

**1.2.1** The basic container shall consist of a complete enclosure (base, top, four sides) with access.

**1.2.2** If required, facility for fork lifting of the container shall be provided in accordance with the appropriate annex.

**1.2.3** The structure shall be designed to provide the maximum usable internal volume available within the limit of structural design including access closing.

## 2 Container construction

### 2.1 General construction

**2.1.1** The maximum gross weight[1] for each container is shown in the appropriate annex.

**2.1.2** Robustness, reliability and maintainability shall be major factors in the design commensature with planned service life.

**2.1.3** The centre of gravity of the load can vary laterally and longitudinally as shown in figures 2, 3 and 4.

**2.1.4** Stacking capability is not required.

**2.1.5** The materials and processes used in the construction shall be capable of withstanding extremely hard usage for a cost related life. Materials shall be suitably sealed against liquid absorption to ensure no deterioration in strength in normal environmental conditions.

**2.1.6** All surfaces and edges shall present no sharp or rough edges potentially injurious to personnel or cargo.

**2.1.7** The materials used should be flame resistant, in accordance with appropriate regulatory requirements.

### 2.2 Base construction

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

**2.2.2** The base panel shall be smooth and free from discontinuities or projections which may be a hazard to personnel, cargo, aircraft, ramp and terminal handling equipment. The construction shall be designed for strength and durability to withstand harsh treatment during its planned service life. It shall have a high reistance to impact and wear. Attachment of the base panel to the container box (where these are not of integral construction) shall be by means of fasteners which can be assembled with normal hand tools.

1) The term "weight" is used throughout this International Standard instead of the correct technical term "mass", in order to conform to current commercial usage (see clause 8).

**2.2.3** Care must be exercised in the design and construction of the base to ensure that flatness of the lower surface can be maintained in service and that the base is of adequate strength to minimize bowing.

**2.2.4** All base edges shall have a minimum radius as shown in figure 1 depending upon the chosen edge design, and the base corners should have a 63 ± 12,7 mm (2.5 in ± 0.5 in) radius in the plane of the base panel. Alternatively both edges at the corners should be tapered off 9,5 mm (3/8 in) over a length of 152,4 mm (6 in) and the intersection of the tapers blended with a 25,4 mm (1 in) radius. Each type of corner shall conform to the vertical dimensions shown in figure 1.

**2.2.5** The base design shall provide for support and ease of movement at the rated distributed gross weight on minimum conveyor systems as defined in 3.1.

**2.2.6** The optional base fork-lift tine entry and separation should be designed so that the base panel of the unit imparts no more than 9,55 kPa[1] (200 lbf/ft$^2$) to the supporting conveyor system.

## 2.3 Body construction

**2.3.1** The sides, roof and access closure shall be of minimum weight to provide maximum stability during ground and airborne handling. Any attachments between the base and the container box shall make a minimum intrusion into the base area with no sharp edges or bolt heads. The top of the container shall be self draining and shall be designed for easy snow clearance.

**2.3.2** Access for loading is generally required on one or both longer sides although positions may vary to suit individual requirements. Loading may be further assisted by providing access through the roof panel.

**2.3.3** Means for the manual movement of the container shall be provided.

**2.3.4** The container should be compatible with the aircraft lower compartment when rapid decompression occurs. The equivalent of at least 645 cm$^2$ (10 in$^2$) of pressure relief areas shall be provided where considered necessary.

## 2.4 Access closures

**2.4.1** Closures shall be designed to avoid finger pinching hazards and shall be of sufficient strength to contain the load during air and ground transportation.

**2.4.2** The access closures shall have a minimum number of securing devices to sustain the handling loads at maximum gross weight without unlocking. These devices are required to secure the access closures in a positive position. They should be so located that they cannot damage, or become damaged by, adjacent containers. No tools shall be required to operate the closures or the securing devices.

**2.4.3** Facility shall exist for the safe retention of access closures in the open position.

## 2.5 Tie-down fittings

Provision may be made for internal securing of the load, such as ring tie-down fittings, these being preferably attached to the base at the corners.

## 2.6 Placard holders

**2.6.1** One or more placard holders to accept destination cards of dimensions 209 mm × 149 mm (8.25 in × 5.88 in) shall be provided. The upper edge of the holder shall not be more than 1 020 mm (40 in) from the bottom of the base.

**2.6.2** It is suggested that the placard holders should also be capable of being used as a board for chalk or grease pencil markings.

# 3 Operational criteria

## 3.1 Container conveyor system

**3.1.1** The minimum conveyor system for half width containers is :

a) Three rows of rollers approximately equally spaced over a minimum width of 1 562 mm (61.4 in), with two rows at the extreme edges of the allowed width and composed of 38 mm (1.4 in) diameter rollers 76,2 mm (3 in) long, uncrowned and with an edge radius of 1,5 mm (0.06 in) spaced on centres 254 mm (10 in) apart.

b) 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.

c) Ball transfer units with 25,4 mm (1 in) diameter balls located on a 127 mm × 127 mm (5 in × 5 in) grid pattern.

**3.1.2** For full width containers when moved in a direction parallel with the short edges, the requirements specified in 3.1.1 apply, except for the number of rows of rollers.

Five rows of rollers may be assumed with two edge supporting rows and three approximately equally spaced intermediate rows.

1) 1 Pa = 1 N/m$^2$

### 3.2 Bridging and cresting

**3.2.1** The container loaded to its maximum gross weight shall be capable of negotiating a floor to ramp angle of 10° in either a bridging or a cresting configuration with no permanent deformation.

### 3.3 Impact loads

The container shall be capable of withstanding repeated impacts of the base assembly against fixed stops at a velocity of 0,3 m/s (1 ft/s) with the container at its maximum gross weight. Under these impact conditions the container shall not discharge its contents nor exhibit permanent deformation in excess of that established in 7.2.

## 4 Environmental criteria

### 4.1 Atmospheric conditions

Insofar as atmospheric conditions may affect the performance of the container or any part thereof, it should be taken into account that during air transportation, temperatures range from − 55 to + 70 °C (− 65 to + 160 °F) with relative humidity which varies from 20 to 85 %. These are the mean temperature and humidity figures world-wide without taking into account extremes in temperature such as those experienced in arctic, sub-polar or desert regions. Exposure to these temperatures and relative humidities, however, is not a test requirement.

### 4.2 Protection

All components of the container shall be protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion or other causes where the type of material used requires such protection.

## 5 Customs requirements

It is recommended that provisions be made for closing and sealing the container to meet Customs clearance and security requirements.

## 6 Additional design options

The following may be added as design options required by a particular airline or shipper :

a) the capability of being dissassembled and the components of the container stacked;

b) component and sub-assembly interchangeability;

c) shelf capability;

d) forklift capability;

e) approval for transport under Customs seal;

f) water resistance against heavy driving rain.

## 7 Performance tests

**7.1** Structural tests shall be carried out at the maximum gross weight and at the most adverse centre of gravity condition.

**7.1.1** The container loaded to its maximum gross weight and moving at velocity of 0,3 m/s (1 ft/s) shall be impacted at the base panel against two rigid stops, each stop being not more than 50,8 mm (2 in) wide.

**7.1.2** The container will be impacted 50 times on each side having a design variance (i.e. access side, back wall, end wall, over-hang end). 25 % of these impacts shall be initiated with the container moving at an angle 15° offset to the leading edge in the direction of travel; an additional 25 % of these will be with the container offset 15° in the opposite direction.

### 7.2 Test results

On the completion of these tests the permanent deformation of the loaded container shall not exceed 19 mm (0.75 in). The measurements shall be made after each edge has been tested and cumulatively.

## 8 Markings

**8.1** All containers covered by this International Standard shall be marked in accordance with the following requirements :

The markings shall be positioned at the top of the outboard and inboard ends, and optionally on both sides of the container, in such a manner that good readability is ensured under all phases of handling.

Minimum lettering height

25 mm (1 in)

| |
|---|
| Maximum gross weight ..... kg ( ..... lb) |
| Actual Tare Wt. ..... kg (..... lb) |
| Ext. volume ..... $m^3$ ( ..... $ft^3$) |

NOTE — All weights to be rounded to the next highest 0,5 kg or full pound.

**8.2** The following additional manufacturer's markings shall be indicated on the container. The positioning of such markings is optional. The letters and numbers shall not be less than 4,83 mm (0.19 in) high.

| |
|---|
| Manufacturer ..... (Name and country) |
| Part number ..... |

Dimensions in millimetres
(Dimensions in inches in parentheses)

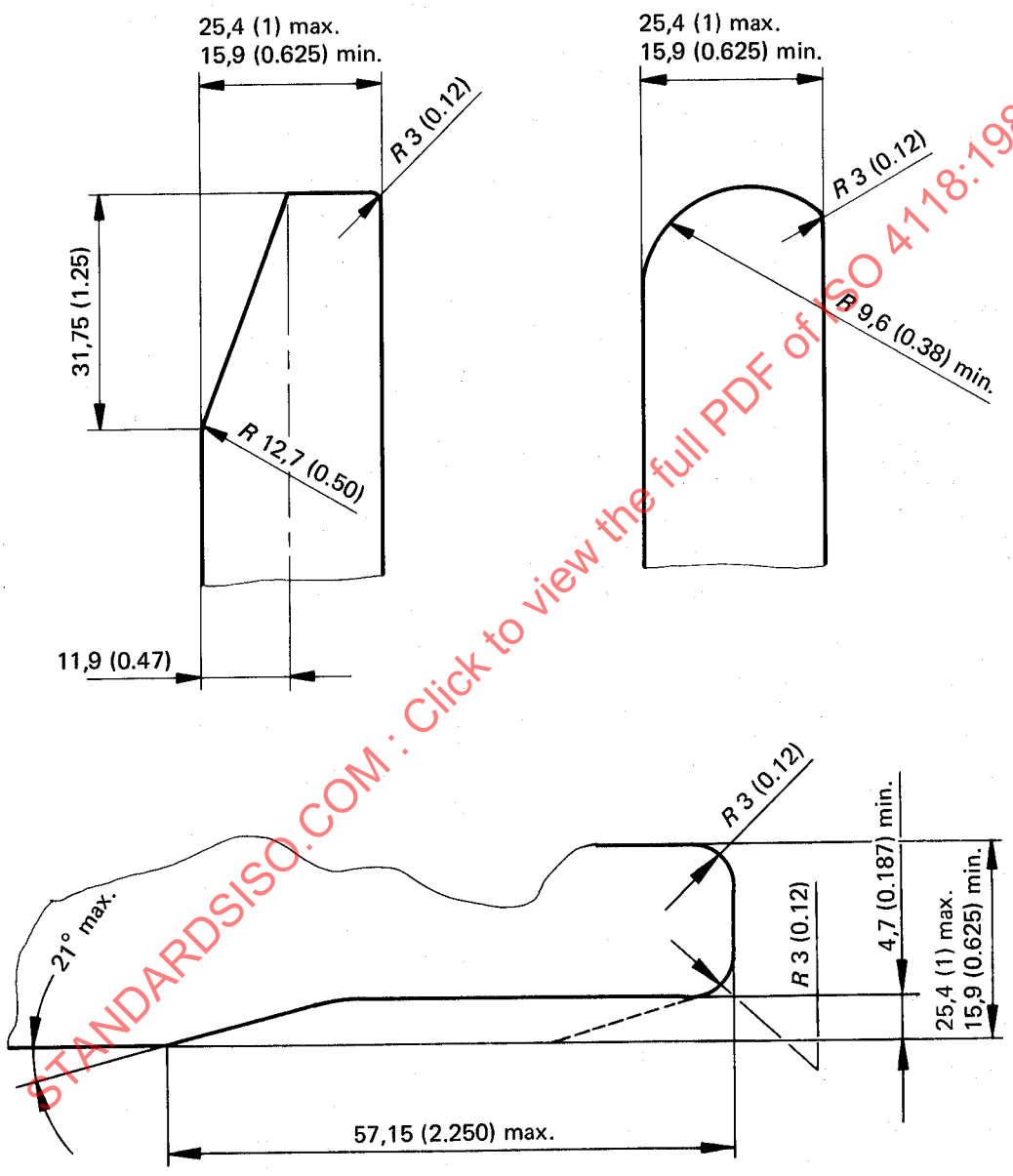


**Figure 1 — Radius of base edges**

# Annex A

# Dimensions and design requirements for non-certified aircraft half width contoured containers

## A.1 Size

Dimensions are given in figure 2.

## A.2 Tare weight

The design objective for the tare weight of the container, including the base, is recommended to be not greater than 152 kg (335 lb).

## A.3 Weight and centre of gravity position

**A.3.1** Unless otherwise specified, the maximum loaded gross weight shall be 1 588 kg (3 500 lb).

**A.3.2** The centre of gravity range is shown in figure 2.

## A.4 Forklift entry

If required the forklift entry shall be provided on at least the two long sides, although 4-way entry is preferred. The fork accesses should be protected if possible, and chamfers at least are recommended.

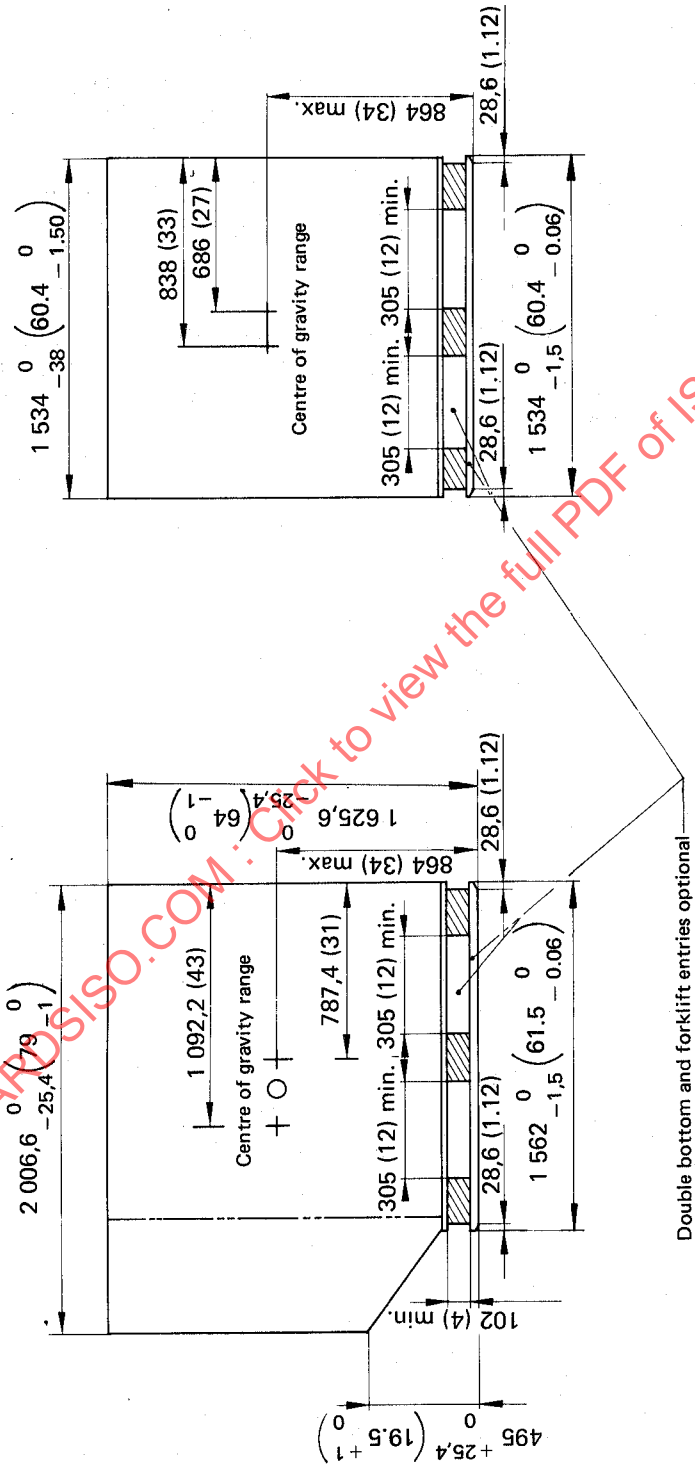


Figure 2 — Dimensions of non-certified aircraft half width contoured containers

# Annex B

# Dimensions and design requirements for non-certified aircraft half width rectangular containers

## B.1 Size

Dimensions are given in figure 3.

## B.2 Tare weight

The design objective for the tare weight of the container, including the base, is recommended to be not greater than 136 kg (300 lb).

## B.3 Mass and centre of gravity position

**B.3.1** Unless otherwise specified, the maximum loaded gross weight shall be 1 450 kg (3 200 lb).

**B.3.2** The centre of gravity range is shown in figure 3.

## B.4 Forklift entry

If required the forklift entry shall be provided on at least the two long sides, although 4-way entry is preferred. The fork accesses should be protected if possible, and chamfers at least are recommended.

## B.5 Marking

Both inboard and outboard panels shall be marked to clearly indicate the sides of the container that shall face forwards in the aircraft as shown in figure 3.