International Standard 6517

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Aircraft — Containers — Base-restrained certified containers for the lower deck of high capacity aircraft

Aéronefs — Conteneurs certifiés à retenue par la base pour le pont inférieur des aéronefs à grande capacité

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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.

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

Australia	Czechoslovakia	South Africa, Rep. of
Austria	France	Spain
Belgium	India	United Kingdom
Brazil	Italy	USSR
Canada	Netherlands	
China	Romania	

No member body expressed disapproval of the document.

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Aircraft — Containers — Base-restrained certified containers for the lower deck of high capacity aircraft

0 Introduction

The basic functions of the containers are :

a) the unitization of baggage, cargo or mail during ground handling and transportation, and

b) the restraint of its contents in flight.

1 Scope and field of application

This International Standard covers the design, fabrication, performance and testing requirements for a general purpose half-sized lower deck compartment preloaded container capable of being used by either airlines or by shippers and requiring airworthiness certification. Separate requirements have been included for users who prefer a cargo-only unit. The designators A1 and A2 refer to the general purpose unit for carriage of baggage, cargo or mail. The designators A1C and A2C refer to a cargo-only unit.

1.1 Basic container sizes

A1 and A1C, width 2 007 mm (79 in) (see figure 1)

A2 and A2C, width 2 337 mm (92 in) (see figure 2)

1.2 Basic container configuration

1.2.1 The basic container shall consist of a complete enclosure (top, base and sides at inboard and outboard), two doors (one forward and one aft end) and provisions for an adjustable shelf or shelves.

1.2.2 The structure shall be designed to make the maximum internal cross-section available for loading cargo within the limits of space required for latch and structural design. The minimum recommended clear opening shall be 1 480 mm wide × 1 520 mm high (58,25 in × 60 in), except where gussets are used as defined in paragraph 2.1.3.2.

1.2.3 The base of the container shall be designed for movement on the aircraft conveyor system as well as the various commercial type conveyors in use at terminals.

2 Requirements

2.1 General requirements for design

The design, materials, and construction of the container shall be of aircraft quality. Maintainability and repairability shall be a factor in the design to ensure the minimum need for maintenance. Any such maintenance and repair should be able to be done with ease and at minimum cost.

2.1.1 Airworthiness approval

The container manufacturer shall apply to the applicable airworthiness authority to obtain approval for use of this container in aircraft whose cargo compartments require the use of base-restrained certified containers.

2.1.2 Materials

The materials and processes selected shall provide for maximum service life by giving consideration to the extremely hard usage to which the container will be subjected. All metal parts shall be suitably protected against corrosion. All nonmetallic materials which are liquid-absorbent shall be sealed or treated to prevent liquid absorption. Materials shall be flame resistant.

2.1.3 Construction

2.1.3.1 Base

The size and shape of the container base shall be as shown in figures 1 or 2 and in figures 8 or 9. The base shall not contain rough or sharp edges potentially dangerous to personnel, cargo, aircraft, or terminal handling equipment. The construction of the base shall be designed for strength and durability to withstand harsh treatment in service. The base shall be structurally attached to, and be an integral part of, the container assembly. The base shall be removable with hand tools and shall be interchangeable.

The base shall comply with the following conditions :

a) ball indentation per 2.3.3.1

b) ball caster per 2.3.3.2

c) abrasion per 2.3.3.3

d) local indentation loads per 2.3.3.4 and 2.1.4.1

The base will be able to withstand static compression loads equivalent to six containers at a gross load of 11 340 daN (25 500 lbf) applied fore or aft.

2.1.3.2 Body

The wall and vertical shear panel thicknesses shall be the minimum consistent with strength requirements and limits of sound design practices, but shall not exceed 25 mm (1 in). Any attachments between the base and the inboard panels shall be designed to have a minimum intrusion into the door area. Gussets are allowed at the junctions of panels and base or top to allow transfer of bending moments. The size of all gussets will be the minimum consistent with structural requirements. The top of the container shall be self draining. The top surface must be designed to be easily cleaned of snow.

To facilitate repair body assembly, component parts shall be readily removable by the use of hand tools and shall be interchangeable.

2.1.3.2.1 Two flush handles or straps shall be located on each side panel for manual movement of the container. Each handle shall provide an area equivalent to 150 mm × 150 mm (6 in × 6 in) and 76 mm (3 in) deep for gripping with a gloved hand.

2.1.3.3 Doors

2.1.3.3.1 The container shall have two doors (one at the forward end and one at the aft end) to enable loading from either end or both ends simultaneously. The doors shall be designed to make the maximum internal cross-section available for loading. With the container on a 500 mm (20 in) high dolly or conveyance system, it shall be possible for one man to open and stow or close the door in no more than 15 s. It shall be possible to open both doors of the container in an area with a 2 290 mm (90 in) high ceiling when the container is on a 500 mm (20 in) high dolly. The doors shall be stowable on top of the container.

As an option, the container may have one door (on the forward or aft end) where ground handling facilities and operational procedures permit.

For security purposes, each door should be made in not more than two rigid panels. The hinge shall be located to permit opening of the door with a 100 mm (4 in) high obstacle adjacent to the base. The door will be designed to avoid a finger-pinching hazard at the lower hinge.

2.1.3.3.2 A1 and A2 container doors

The general purpose container doors shall be the full width of the container.

2.1.3.3.3 A1C and A2C container doors

The cargo container doors shall be sized to allow a recommended clear opening of 1 480 mm (58.25 in) wide and 1 520 mm (60 in) high.

When the cargo container is designed primarily for special handling or cargo protection, for example, thermal control which demands minimum access to meet the special requirements, it may have only one door on either the forward or the aft side.

2.1.3.3.4 Handles, straps or hand holds shall be provided on each door for lifting the door and for manual movement of the container. Each handle should provide an area equivalent to 150 mm × 150 mm (6 in × 6 in) by 76 mm (3 in) deep for gripping with a gloved hand. The handles shall be designed so they can cause no damage to adjacent containers.

2.1.3.3.5 The doors shall have a minimum number of positive latches to sustain the flight loads without unlatching. The latches required to secure the doors in the closed position shall be located so that they cannot damage, or become damaged by, adjacent containers should they inadvertently be left open or become open in flight. No tools shall be required to open or close the doors or latches. It shall be possible to unlatch and at least partially open the door with the container restrained in the airplane. Door latch and handle design shall preclude damage to container assembly during door stowage with no special attention.

2.1.3.4 Shelves (optional)

2.1.3.4.1 A1 container shelf

There may be one (or more) full width, full depth shelf (shelves) as shown in figure 10. It is recommended that the shelf (shelves) be adjustable by two men in 130 mm (5 in) increments through the entire constant cross-section. The time required to change shelf positions shall not exceed 30 s. Stowed position for the shelf (shelves) shall be directly under the container top in such a manner as to occupy a minimum usable volume. The shelf (shelves) attachment and adjustment devices shall be manually operable without the use of tools, and shall positively retain the shelf (shelves) at the selected position.

Shelf height positions shall be numerically identified at all attachment points. Removal of the shelf (shelves) from the container shall require the use of hand tools.

2.1.3.4.2 A2 container shelves

There may be two or more shelves as shown in figure 11. Shelves shall be full length. The inboard shelf (shelves) shall be over the base and it is recommended that the inboard shelf (shelves) be adjustable by two men from top to bottom in 130 mm (5 in) increments, one of which must coincide with the level of the outboard shelf. The time required to change shelf positions shall not exceed 30 s. The stowed position for the shelf (shelves) shall be directly under the container top in such a manner as to occupy a minimum usable volume. The shelf attachment and adjustment devices shall be manually operable without the use of tools and shall positively retain the shelf (shelves) at the selected position. Shelf height positions shall be numerically identified at all attachment points. Removal of the shelf (shelves) from the container must require the use

of hand tools. The outboard shelf shall be located over the sloping surface of the outboard panel and shall fold down to be flat on the sloping surface. The shelf horizontal position height shall be at the juncture of the sloping and vertical surfaces of the outboard panel.

2.1.3.4.3 A2C cargo container shelf

Where an outboard shelf is installed, it shall be as shown in figure 11. The shelf is located over the sloping surface of the outboard panel and shall fold down to be flat on the sloping surface. The shelf position height shall be at the juncture of the sloping and vertical surfaces of the outboard panel.

2.1.3.5 Tie-down fittings

Adequate internal seat-track type tie-down fittings shall be provided. Tie-down fitting ratings shall be 907 kg (2 000 lb) in any direction.

2.1.3.6 Destination placard holder

One or more placard holders shall be fitted to accept a 210 mm × 150 mm (8.25 in × 5.875 in) destination placard.

2.1.4 Performance

2.1.4.1 Base indentation

2.1.4.1.1 Local indentation of the container base panel

The maximum indentation (permanent set) allowed at any location of the lower surface of the base shall be 0,25 mm (0.01 in) for the following condition in accordance with figure 12 :

— Apply a 890 daN (2 000 lbf) load by a steel roller, 64 mm (2.5 in) long by 38 mm (1.5 in) diameter per figure 12.

2.1.4.1.2 Local indentation of container base edge

The maximum indentation (permanent set) allowed at any location along the periphery of the base edging shall be 0,13 mm (0.005 in) for the following conditions per figure 12.

a) Apply a 2 670 daN (6 000 lbf) load parallel to the base over an area of 51 mm (2 in) long by 8 mm (0.3 in) wide.

b) Apply a 890 daN (2 000 lbf) load parallel to the base over an area of 5 mm (0.2 in) long by 8 mm (0.3 in) wide.

2.1.4.2 Bridging/cresting

The container assembly shall be capable of negotiating a floor up to a ramp angle of 10° in either bridging or cresting during terminal movements without permanent deformation. To meet this condition the container uniformly loaded to gross weight shall be capable of being supported at the cresting point through a roller contact of 1,5 m (60 in) minimum width with a roller of 38 mm (1.5 in) maximum diameter.

2.1.4.3 Decompression loads

The container shall be compatible with the aircraft lower compartment when rapid decompression is incurred. Relief areas with a minimum total area of 6 500 mm^2 (10 in^2) shall be provided. Note that clearances between doors and container base may contribute to this 6 500 mm^2 (10 in^2) area.

2.1.4.4 Impact loads

The container shall be able to withstand the following impact loads without distortion beyond the limits given below and in figures 13 and 14.

The table below shows four test conditions that are to be satisfied. Figures 13 and 14 describe the test configurations. For conditions 1 and 2, a simulated container is to be used to impact the container being tested. The impacts under test conditions 1 and 2 shall be made with the simulated container contacting the test container square, and randomly up to 15° from square. For conditions 3 and 4, the test container will be moved to impact against stops at the base.

Uniformly load each shelf and the base relative to the full volume above the shelf and base on the test container and on the simulated container (conditions 1 and 2). Locate shelves as shown in figures 13 and 14. The dimensions shown (figures 13 and 14) will be checked before and after each series of tests to determine distortion. The maximum allowable distortion is shown in figures 13 and 14. The maximum allowable local indentation at the point of impact is 6 mm (0.25 in).

2.1.5 Weight[1)]

The design objective for the tare weight of the container shall be not to exceed 127 kg (280 lb) plus a maximum of 18 kg (40 lb) for shelf (shelves).

2.2 Design loads

2.2.1 The maximum loaded gross weight[1)] of the container shall be 1 590 kg (3 500 lb).

Test condition	Figure	Number of impact cycles	Gross weight[1)] container and cargo				Impact velocity	
			A1		A2			
			kg	(lb)	kg	(lb)	cm/s	(ft/s)
1	13	1 200	795	(1 750)	795	(1 750)	61	(2)
2	13	50	1 591	(3 500)	1 286	(2 830)	61	(2)
3	14	1 200	795	(1 750)	795	(1 750)	30,5	(1)
4	14	50	1 591	(3 500)	1 286	(2 830)	30,5	(1)

1) It should be noted that the term "weight" is used instead of the term "mass" in conformity with current commercial practice and international conventions.

2.2.1.2 The A1, A1C, A2 and A2C containers shall be able to restrain the ultimate loads listed in table 1 with the centre of gravity as shown in figure 7 when restrained per figures 5, 6 and 7.

2.2.1.3 The deflection limits for the A1 container shall not exceed those given in figure 3 when loaded in accordance with table 2 below with the centre of gravity as shown in figure 7 when restrained as in figures 5, 6 and 7.

2.2.1.4 The deflection limits for the A2 container shall not exceed those given in figure 4 when loaded in accordance with table 2 below with the centre of gravity as shown in figure 7 when restrained as in figures 5, 6 and 7.

2.3 Environmental criteria

2.3.1 The container shall be designed and built using materials which will provide maximum serviceability and protection of contents under intended environmental conditions.

2.3.2 The structural and operational integrity of the container shall be maintained in a temperature environment from −54 to +71 °C (−65 to +160 °F).

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

2.3.3.1 Ball test

The container base surface or a representative portion thereof shall be subject to 1 334 daN (300 lbf) on a 25 mm (1 in) diameter steel ball without permanent indentation to an excess of 0,50 mm (0.020 in).

2.3.3.2 Ball caster

The base or a representative portion thereof shall be subjected to a uniformly distributed load of 423 daN (210 lbf), supported by four 25 mm (1 in) diameter steel ball casters on a 130 mm (5 in) grid pattern. The base shall be moved over the casters for a minimum of 5 000 passes along a fixed line in each of two directions 90° to, and intersecting each other. The length of the stroke shall be approximately 300 mm (12 in). At the conclusion of the test, there shall be no evidence of deterioration of the base/ball caster interface surface.

2.3.3.3 Abrasion test for plastic coated or magnesium base materials

Three samples of the container base assembly material shall be subjected to a test method equivalent to United States Federal Test Method Standard No. 406, Method 1091, except that the abrasion wheel shall be dressed every 1 000 cycles. A CS-10 wheel with a load of 500 g shall be used for all tests. The average of weight loss shall not exceed the following values :

after 1 000 revolutions — 0,015 g

after 2 000 revolutions — an additional 0,005 g

after 5 000 revolutions — an additional 0,030 g

up to a total of 0,050 g

2.3.3.4 Local indentation and impact load test

Loads shall be applied to the container base in accordance with 2.1.4.1. Permanent deformation shall not exceed that shown in 2.1.4.1.

2.3.3.5 Rain test

Water shall be directed over the container around the door to simulate a heavy driving rain equivalent to what would be

Table 1 — Ultimate design loads

Forward and aft		Side		Up		Down	
daN	(lbf)	daN	(lbf)	daN	(lbf)	daN	(lbf)
1 890[1)]	(4 250)[1)]	1 360[1)]	(3 060)[1)]	3 520	(7 920)	6 420	(14 430)

1) These loads will be tested in conjunction with a 1 890 daN (4 250 lbf) down load.

Table 2 — Deflection design loads

Forward and aft		Side		Up		Down	
daN	(lbf)	daN	(lbf)	daN	(lbf)	daN	(lbf)
1 260[1)]	(2 830)[1)]	908[1)]	(2 040)[1)]	2 350	(5 280)	4 280	(9 620)

1) These loads will be tested in conjunction with a 1 260 daN (2 830 lbf) down load.

experienced by a container secured to an open truck and being transported at 80 km/h (50 mile/h). For this test a stream of water shall be applied to all exterior joints and seams of the container from a nozzle of 12,5 mm (0.5 in) inside diameter at a pressure of about 1 bar [corresponding to a head of about 10 m (33 ft) of water]. The nozzle shall be held at a distance of 1,5 m (5 ft) from the container's exterior joints and seams and the stream of water shall have a rate of travel of 100 mm/s (4 in/s). Upon completion of the test, the container shall be free from penetration of water.

2.3.4 Operational handling

The container shall be so designed that it will withstand handling common to air-land freight terminal and ramp operations.

2.3.4.1 Flight and emergency load test

The container loaded to the weights in table 1 and centre of gravity location specified in figure 7 and restrained or supported as specified in figures 5, 6 and 7 shall be tested for each of the principle directions, forward/aft, side, up and down. Permanent deformation is allowed. Tests shall be made with the centre of gravity at the most adverse location within the range given in figure 7.

2.3.4.2 Deflection tests

The container assembly shall be loaded to limit loads shown in table 2. When subjected to these factors the deflections shall not exceed the dimension limits specified in figures 3 and 4 and shall result in no permanent deformation. Tests shall be made with the center of gravity at the most adverse location within the range shown in figure 7.

2.3.4.3 Static load test

The fully loaded container shall be supported by a simulated conveyor system as shown in figure 7. If shelves are included, they shall be loaded to 545 kg (1 200 lb). The container assembly doors shall be fully opened and closed for three complete cycles during the test. The doors shall open and close with no significant binding, and the locks shall engage and disengage with ease. Permanent deformation of the container assembly or any detail part as a result of this test shall not occur.

3 Markings

3.1 All containers covered by this International Standard shall be marked as shown below. The markings shall be shown at the top on the outboard and inboard side panels, as well as optionally on both ends of the container in such a manner that good readability is ensured during all phases of handling.

Tare weight :............kg/............lb	Lettering not less than 25 mm (1 in) high
External volume :...........m^3/...........ft^3	Lettering not less than 25 mm (1 in) high

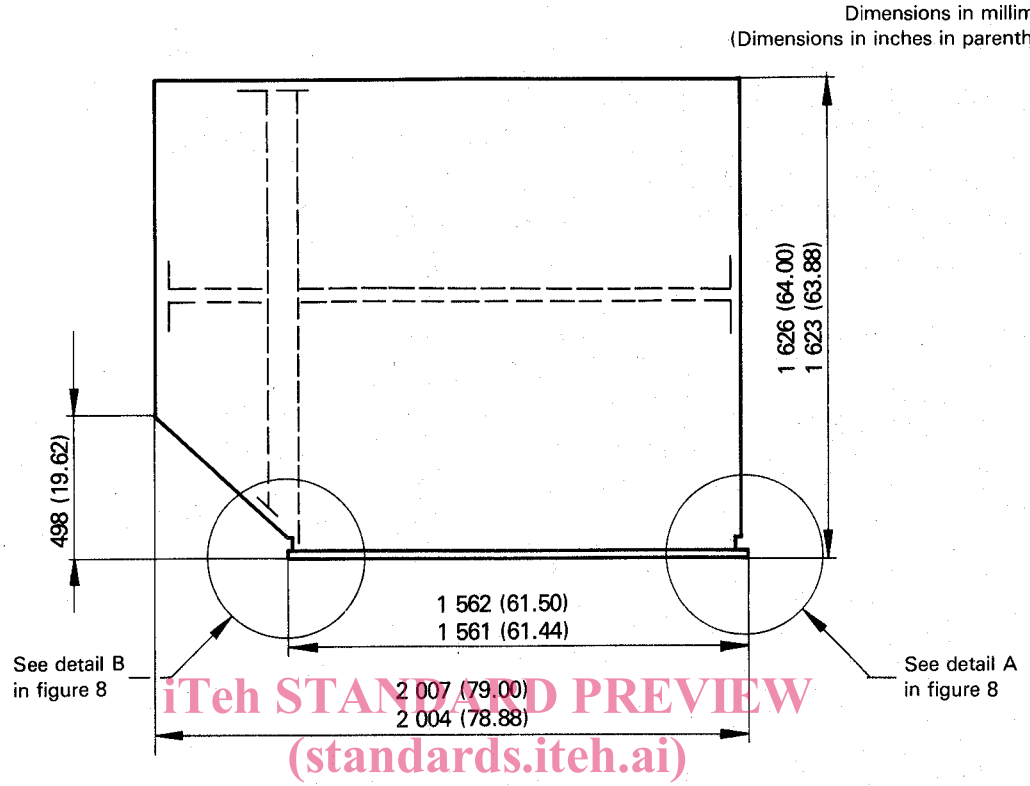
3.2 The following additional manufacturer's markings shall be indicated on the container. The positioning of such markings is optional and the letter size should be approximately 6 mm (0.25 in) high :

Manufacturer :	.... (Name and Country)
Part Number :	....
Certification :	.... (if applicable)

4 General requirements

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

NOTE — The metric equivalents for dimensions have been rounded up or down to the nearest millimetre, except in critical dimensions. The weights have been rounded up to the nearest kilogram. Forces have been rounded up to next half-decanewton.



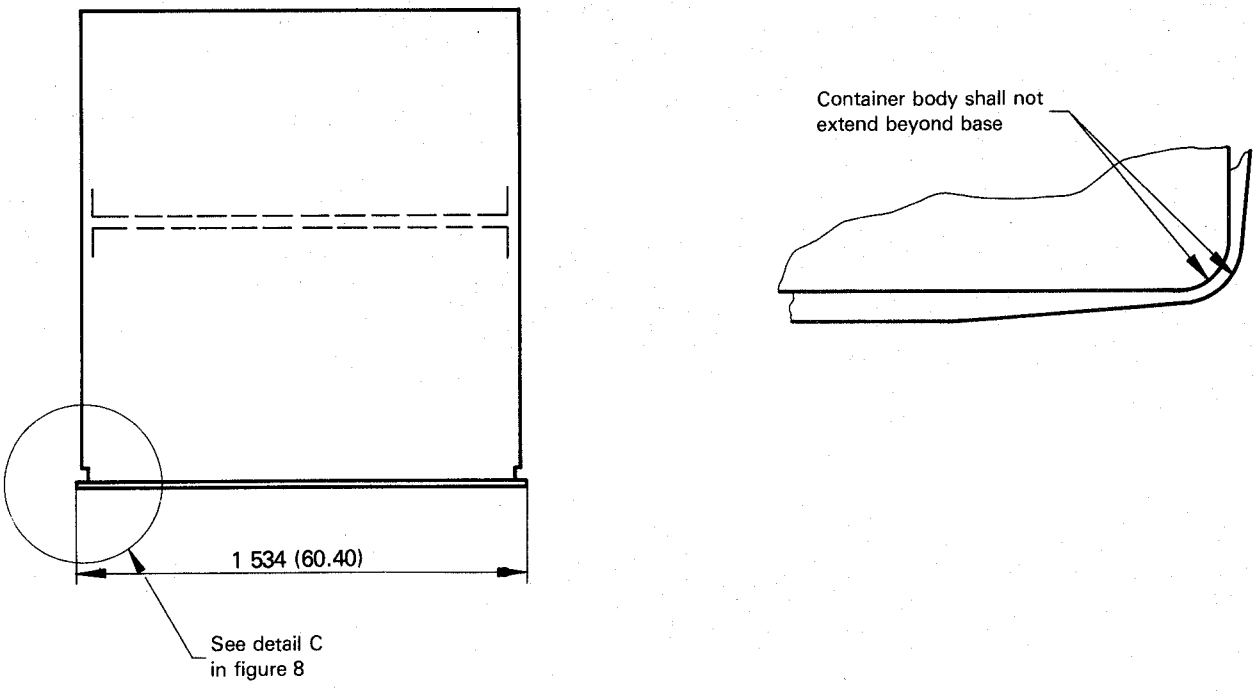


Figure 1 — A1 container

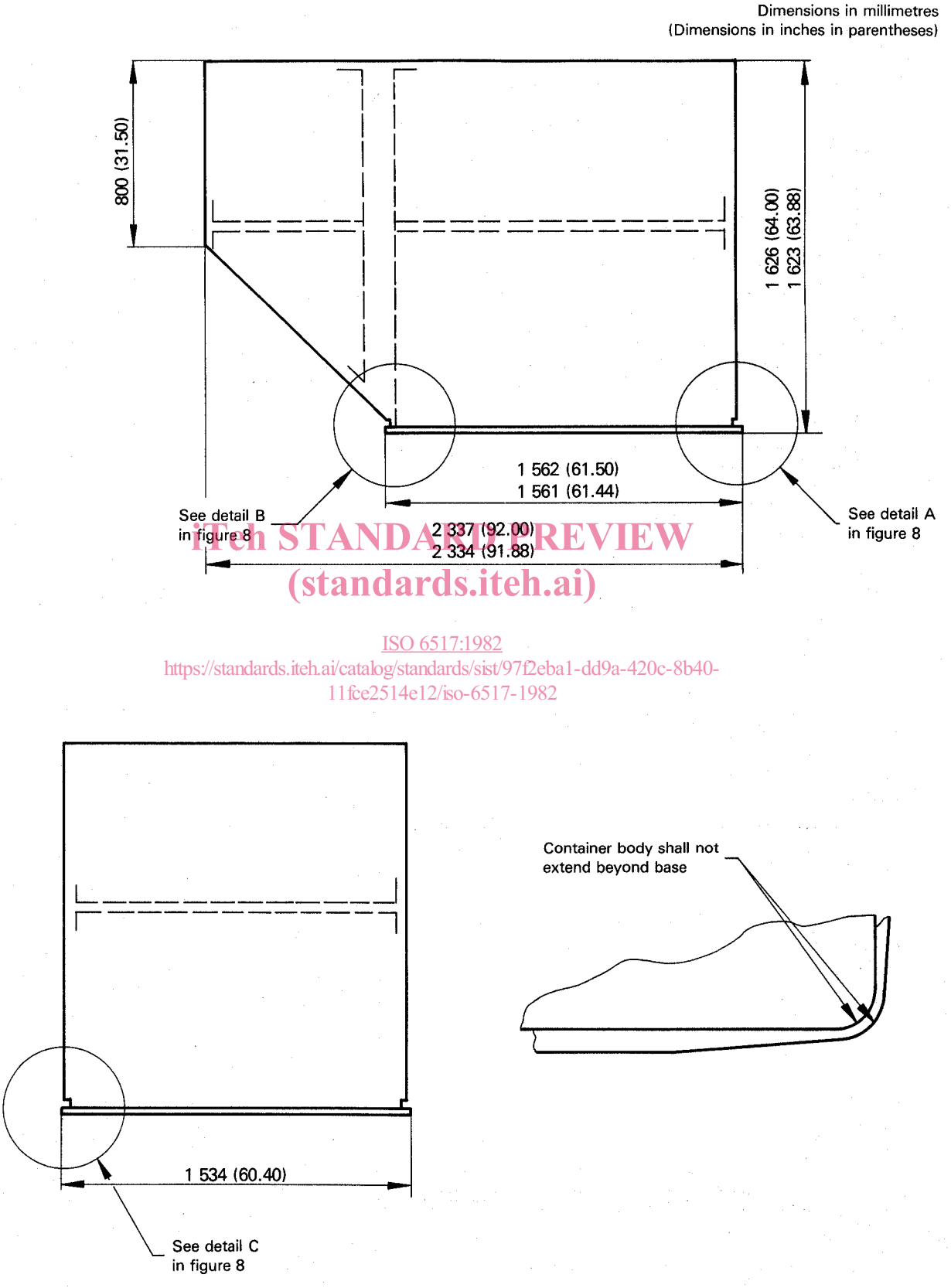
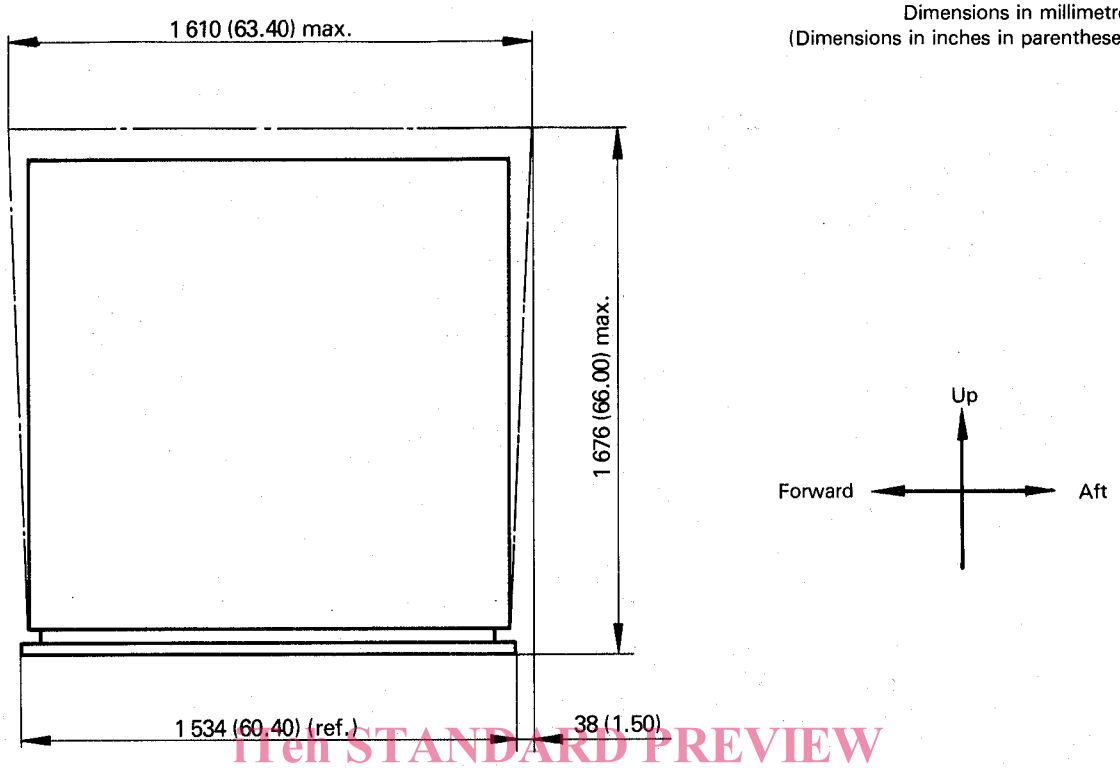


Figure 2 — A2 container

Dimensions in millimetres
(Dimensions in inches in parentheses)



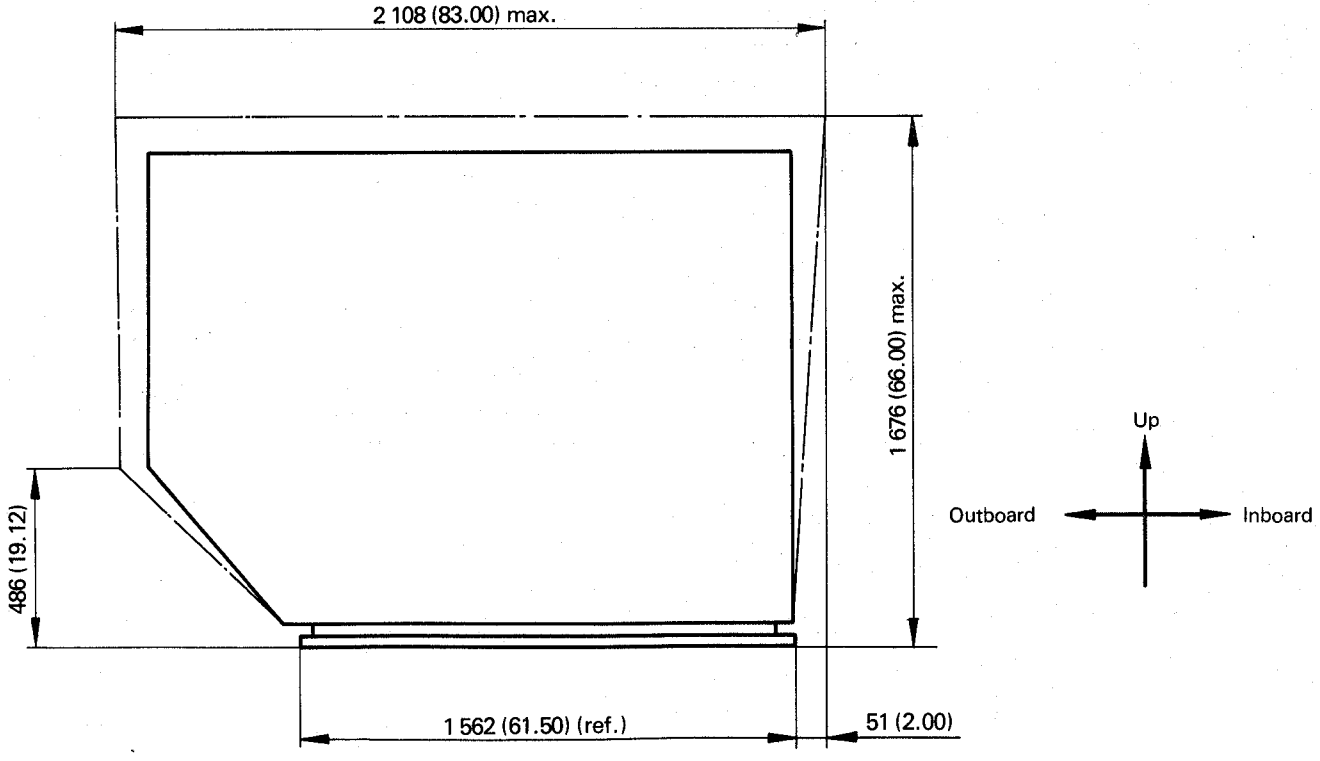
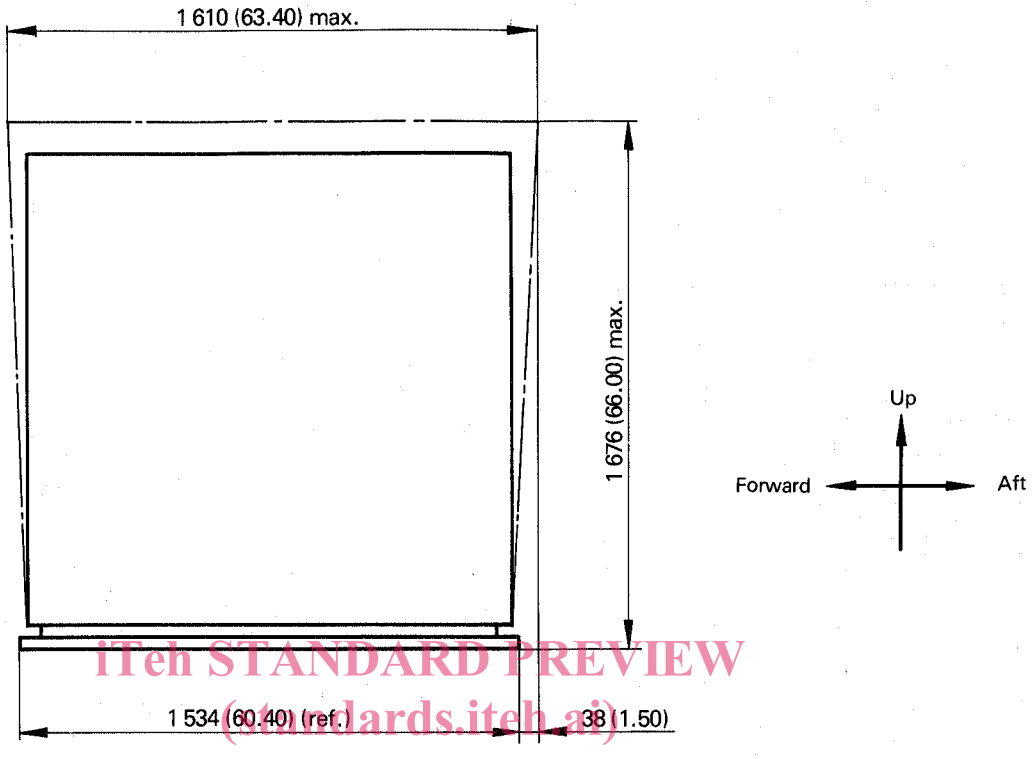


Figure 3 — Deflection limits : A1 container

Dimensions in millimetres
(Dimensions in inches in parentheses)



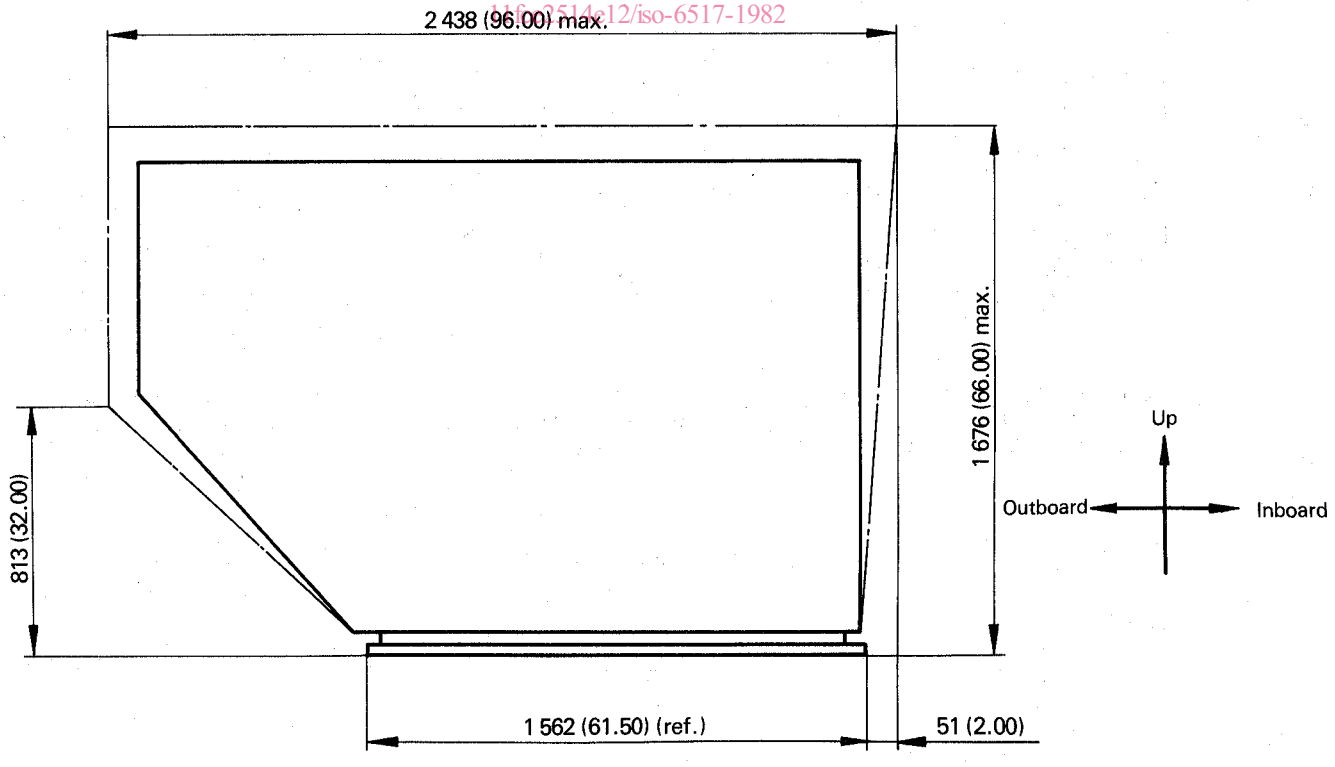


Figure 4 — Deflection limits : A2 container