

INTERNATIONAL STANDARD

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Air cargo equipment — Base-restrained certified containers exclusively for the lower deck of high-capacity aircraft

*Équipement pour le fret aérien — Conteneurs certifiés à retenue par la
base pour le pont inférieur des aéronefs à grande capacité exclusivement*



Reference number
ISO 6517:1992(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6517 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Sub-Committee SC 9, *Air cargo and ground equipment*.

This second edition cancels and replaces the first edition (ISO 6517:1982), of which it constitutes a technical revision.

Introduction

The basic functions of containers are:

- a) the unitization of baggage, cargo or mail during ground handling and transportation, and
- b) the restraint of its contents in flight.

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Air cargo equipment — Base-restrained certified containers exclusively for the lower deck of high-capacity aircraft

1 Scope

This International Standard covers the design, fabrication, performance and testing requirements for general-purpose base-restrained exclusively lower deck compartment preloaded containers for high-capacity aircraft, capable of being used by either airlines or by shippers and requiring airworthiness certification.

NOTE 1 The metric equivalents for dimensions have been rounded up or down to the nearest millimetre, except in critical dimensions. Weights have been rounded up to the nearest kilogram and forces have been rounded up to the nearest 5 N.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4116:1986, *Air cargo equipment — Ground equipment requirements for compatibility with aircraft unit load devices*.

ISO 7166:1985, *Aircraft — Rail and stud configuration for passenger equipment and cargo restraint*.

ISO 8097:1986, *Aircraft — Minimum airworthiness requirements and test conditions for certified air cargo unit load devices (Endorsement of NAS 3610)*.

3 Basic container sizes and identification

3.1 The overall maximum dimensions of the containers are shown in figures 1 to 5.

They embrace two base sizes:

Size K: 1 562 mm × 1 534 mm (61,5 in × 60,4 in)

Size L: 3 175 mm × 1 534 mm (125 in × 60,4 in)

and eight contours:

Contour C: overall width 2 337 mm (92 in) (see figure 2)

Contour E: overall width 2 007 mm (79 in) (see figure 1)

Contour F: overall width 4 064 mm (160 in) (see figure 3)

Contour G: overall width 2 007 mm (79 in) (see figure 5)

Contour H: overall width 2 438 mm (96 in) (see figure 5)

Contour N: fork-liftable version of AKE container (see figure 1)

Contour P: overall width 3 175 mm (125 in) (see figure 3)

Contour U: overall width 4 724 mm (186 in) (see figure 4)

3.2 Containers complying with this International Standard are identified by three letters:

- a) the first letter A denoting certified class II aircraft container complying with the requirements of ISO 8097;
- b) the second letter denoting the base size;

c) the third letter denoting the contour.

The identification code shall be marked on the container.

EXAMPLE

A certified aircraft container (A) of base size 3 175 mm × 1 534 mm (125 in × 60,4 in) (size L) and of overall width 3 175 mm (125 in) (contour P) shall be designated as follows:

ALP

4 Basic container configuration

4.1 The basic container shall consist of a complete structural enclosure.

4.2 The structure shall be designed to make the maximum internal cross-section available for loading cargo, within the limits of the space required for latch and structural design.

5 Requirements

5.1 General

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.

5.1.1 Airworthiness approval

The container manufacturer shall apply to the appropriate airworthiness authority to obtain approval for use of the container in aircraft whose cargo compartments require the use of base-restrained certified containers. (See also 5.2.)

5.1.2 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 non-metallic liquid-absorbent materials shall be sealed or treated to prevent liquid absorption. Materials shall be fire resistant and shall withstand environmental degradation.

5.1.3 Construction

5.1.3.1 Base

5.1.3.1.1 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.

5.1.3.1.2 The base shall comply with the indentation performance requirements of 5.1.4.1.

5.1.3.1.3 Where optional fork-lift capability is provided, the minimum aperture size shall be 102 mm (4 in) high by 305 mm (12 in) wide, with chamfered protected edges.

5.1.3.1.4 Where provided, there shall be fork-lift pockets at least on the two long sides, although three-way entry is preferred on K-size units.

5.1.3.1.5 On L-size units, the distance between the inner edges of the optional fork-lift pockets shall be not less than 813 mm (32 in), and on K-size units not less than 457 mm (18 in).

5.1.3.2 Body

5.1.3.2.1 Any attachments between the base and the 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 the transfer of bending moments. The size of all gussets shall be the minimum consistent with structural requirements. The top of the container shall be self-draining. The top surface shall be designed to be easily cleared of snow.

To facilitate repair and assembly, component parts shall be readily removable with hand tools and shall be interchangeable.

Any gussets in the door opening shall be the minimum consistent with the strength and/or deflection requirements.

5.1.3.2.2 Two non-protruding handles or straps shall be located on each side panel for manual movement of the container. Each handle shall provide for gripping with a gloved hand and shall have a local attachment strength of 445 daN (1 000 lbf) in any direction.

5.1.3.2.3 One or more placard holders shall be fitted to the body to accommodate a destination placard of standard size A5 [210 mm × 148 mm (8 1/4 in × 5 7/8 in)].

5.1.3.3 Doors

5.1.3.3.1 The door opening should be designed to make the maximum possible cross-section available for loading. It shall be possible for one person to open or close the door and any associated net or hardware in no more than 1 min for full-width units (L base size), and no more than 15 s for half-width units (K base size).

It shall be possible to open any type of door without exceeding a height of 1 780 mm (70 in), measured from the underside of the base. The door shall be stowable on top of the unit and means of retaining it in the open position should be provided.

The door shall be capable of being opened with a 102 mm (4 in) high obstacle adjacent to the base.

Where hinges are used, the design shall not allow fingers to be trapped.

In general, most types of container have only one door situated on a long side of the unit.

In some cases, for operational reasons, K-size units may have a door on each long side.

Doors are generally rectangular, but may vary to suit the container contour, the choice of structural shape, or to provide enhanced or a full-width door opening.

5.1.3.3.2 Handles, straps or hand-holds shall be provided on each door for handling the door and for manual movement of the container. These devices shall be able to withstand a 445 daN (1 000 lbf) pull in any direction, and shall be suitable for gripping with a gloved hand. These devices shall be designed to cause no damage to adjacent units.

5.1.3.3.3 Door latch and restraint hardware design shall preclude damage to the shell or door during stowage and installation/removal of the door.

No tools shall be required to open and close the doors or latches.

The door latching and installation mechanisms shall be designed to allow door installation and removal while the container is sitting on uneven surfaces varying by as much as 12,7 mm (0,5 in) over the length of the base.

5.1.3.3.4 It shall be possible to lock (to discourage entry) and to seal the door so as to give visual indications of unauthorized entry.

5.1.3.4 Shelves (optional)

In general, shelves are fitted only into non-rectangular containers that have extended contours with an overhang.

In such units, the shelves are usually located at the junction of the outboard side panel and the sloping panel. In some instances, the shelf is hinged at the outboard edge so that it may be lowered to lie on the sloping panel.

Alternatively, full-width shelves are fitted at half the unit height.

5.1.3.5 Internal cargo restraint

Securing points shall be provided around the interior walls spaced approximately 508 mm (20 in) apart at the following points:

- near the base (not required if equivalent provisions are available at the base);
- at half height, except for K-size units, which shall have securing points at or near the base only.

Each of these points shall be capable of withstanding an omnidirectional load of 1 780 daN (4 000 lbf) near or at the base and 890 daN (2 000 lbf) at half height.

These points shall comply with ISO 7166.

5.1.3.6 Pressure equalization

A minimum vent area of 5 cm² per cubic metre (0,02 in² per cubic foot) of container internal volume should be provided if the door seal venting area is not sufficient. This vent area shall be adequately protected from cargo load shift to ensure that the minimum area is maintained during emergency operations.

5.1.3.7 Rapid decompression

For rapid decompression in the event of an aircraft emergency, the container shall include a minimum vent area of 100 cm²/m³ (0,45 sq in/cu ft) of container internal volume to become open in a duration of less than 0,2 s when submitted to a maximum pressure differential from inside of 14 kPa (2,0 lb/sq in).

5.1.4 Performance

5.1.4.1 Base indentation (see figure 8)

5.1.4.1.1 Local indentation of the container base panel

The maximum indentation (permanent set) at any location of the base panel when subjected to a 890 daN (2 000 lbf) force by a steel roller 51 mm (2 in) long of 25,4 mm (1 in) diameter (see figure 8) shall not exceed 0,25 mm (0,01 in), and when subjected to a 400 daN (900 lbf) force by a

steel ball of 25,4 mm (1 in) diameter shall not exceed 0,5 mm (0,02 in).

5.1.4.1.2 Indentation along the periphery of the base edge

The maximum indentation at any location along the periphery of the base edge shall not exceed 0,13 mm (0,005 in) when subjected to a 890 daN (2 000 lbf) force applied parallel to the base over an area 4,8 mm (0,19 in) long by 5,1 mm (0,2 in) wide.

5.1.4.1.3 Traverse between levels

The container assembly loaded to its maximum gross weight shall be capable of traversing from one item of conveyor equipment to another when there is a height difference of 120 mm (4,72 in) between the two levels, with no detrimental permanent deformation (see 6.3).

5.2 Design loads

5.2.1 The container shall satisfy the design and performance criteria specified in ISO 8097 appropriate to the base size and configuration of the container, for class II units.

5.2.2 The container shall be used to unitize and restrain its contents at the maximum gross mass specified in table 1.

5.3 Environmental conditions

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

5.3.2 The structural and operational integrity of the container shall be maintained at temperatures from -54°C to $+71^{\circ}\text{C}$ (-65°F to $+160^{\circ}\text{F}$).

5.3.3 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.

5.3.4 Particular design attention should be given to preventing the entry of water through door-to-container assembly interface areas, and at panel joints.

6 Testing

The tests specified in 6.1 to 6.6 shall be conducted to demonstrate the ability of the container to withstand the maximum operational loads that may be experienced during handling and transportation without excessive deflection or detrimental permanent deformation.

6.1 Test No. 1 — Horizontal load test

6.1.1 Procedure

Secure the container under test to the aircraft restraint system or a system equivalent to each of those shown in ISO 8097, appropriate to the base configuration.

Apply horizontally to one side of the container a test load equal to the maximum gross weight, less tare. Simultaneously apply an equal test load downwards to the top surface of the base.

Table 1

Unit type	Base dimensions		Maximum gross mass	
	mm × mm	in × in	kg	lb
AKC	1 534 × 1 562	60,4 × 61,5	1 588	3 500
AKE	1 534 × 1 562	60,4 × 61,5	1 588	3 500
AKG	1 534 × 1 562	60,4 × 61,5	1 134	2 500
AKH	1 534 × 1 562	60,4 × 61,5	1 134	2 500
ALF	1 534 × 3 175	60,4 × 125	3 175	7 000
ALP	1 534 × 3 175	60,4 × 125	3 175	7 000
ALU	1 534 × 3 175	60,4 × 125	3 175	7 000

Repeat the test with the test load applied to the side adjacent to the side previously tested.

Should their structure not be identical, test the opposite sides for restraint and panel load in the same manner.

6.1.2 Requirements

The displacement of the intersection of the top and side panel in relation to the base shall not exceed 38 mm (1,5 in).

Upon completion of the test, the container shall show neither detrimental permanent deformation nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

6.2 Test No. 2 — Upward load test

6.2.1 Procedure

Secure the container under test to an aircraft restraint system equivalent to each of those shown in ISO 8097, appropriate to the base configuration.

Apply upwards to the container a test load equal to its maximum gross weight, less tare.

6.2.2 Requirements

Upon completion of the test, the container shall show neither permanent deformation nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

6.3 Test No. 3 — Bridging and cresting

6.3.1 Procedure

Traverse the container, loaded to its maximum gross weight with a central centre of gravity position, on a roller system compatible with the minimum requirements of ISO 4116, and make it pass across a stepped junction with another similar roller system, with the height difference at the junction not less than 120 mm (4,72 in).

At the point balance (cresting) on the edge of the higher platform, hold the container in this position for a minimum of 5 s. Then allow the rear end of the container to drop from the higher platform onto the lower roller platform.

Carry out the test 20 times.

6.3.2 Requirements

Upon completion of the test, the container shall show neither permanent deformation nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

6.4 Test No. 4 — Cyclic test

6.4.1 Procedure

Uniformly load the container to its maximum gross weight with the centre of gravity at not less than half the unit height and make it traverse 100 times over a bed of 25,4 mm (1 in) diameter steel balls spaced on a 178 mm (7 in) matrix. The forward and aft base edges shall impact against fixed steel stops 64 mm (2,5 in) wide at a velocity of 0,3 m/s (1 ft/s).

For K-size units, the stops shall be spaced at 527 mm (20,75 in) with the first stop 603 mm (23,75 in) from the inboard face of the base edge.

For L-size units, the stops shall be located symmetrically at 1 257 mm (49,5 in) and 2 311 mm (91 in) apart either side of the unit centreline of the 3 175 mm (125 in) edge.

The distance traversed during each cycle shall be at least 3 100 mm (112 in).

6.4.2 Requirements

Upon completion of the test, the container shall show neither permanent deformation nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

6.5 Test No. 5 — Racking test (not essential for units with contour P)

6.5.1 Procedure

Load the container to its maximum gross weight. Restrain it against sideways movement at the base of the inboard edge.

Apply a horizontal force along the top edge of the outboard panel, sufficient to raise the outboard edge of the base from the floor or conveyor plane.

6.5.2 Requirements

Upon completion of the test, the container shall show neither permanent deformation nor abnormality which will render it unsuitable for use, and the dimensional requirements affecting handling, securing and interchange shall be satisfied.

6.6 Test No. 6 — Water tightness test

6.6.1 Procedure

Apply a stream of water to all joints and seams of the containers from a nozzle of 12,7 mm (0,5 in) inside diameter at a pressure of about 1 bar¹⁾ [corresponding to a head of about 10 m (33 ft) of water] on the upstream side of the nozzle. Hold the nozzle at a distance of 1,5 m (5 ft) from the corner under test, and move the stream at a speed of 100 mm/s (4 in/s).

Procedures involving the use of several nozzles are acceptable providing that each joint or seam is subjected to a water loading no less than that which would be given by a single nozzle.

6.6.2 Requirements

Upon completion of the test, the container shall be free from penetration of water.

7 Markings

7.1 All containers complying with this International Standard shall be marked as shown below, in such a manner that good readability is ensured during all phases of handling. The lettering shall be not less than 25 mm (1 in) high.

Tare weight:	kg	lb
External volume:	m ³	ft ³

7.2 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:

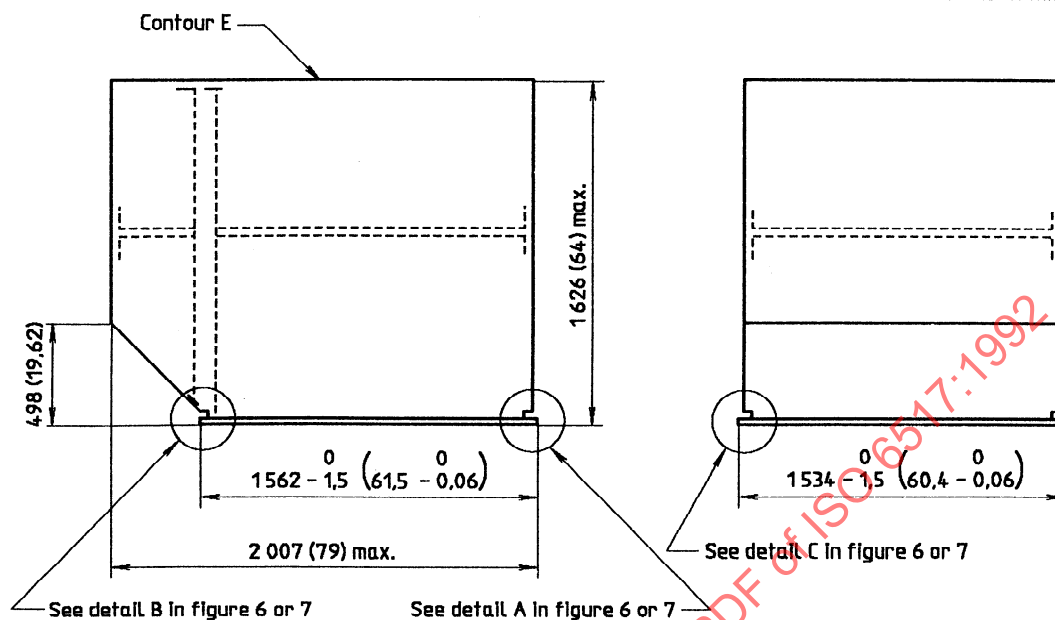
8 Customs/security sealing (optional)

The container shall be designed, constructed and equipped in such a manner that

- no goods can be removed from, or introduced into, the sealed container without leaving obvious traces of tampering or without breaking the customs seal;
- customs seals can be simply and effectively affixed;
- the container contains no concealed space where goods may be hidden; and
- all spaces capable of holding goods are readily accessible for customs inspection.

1) 1 bar = 100 kPa

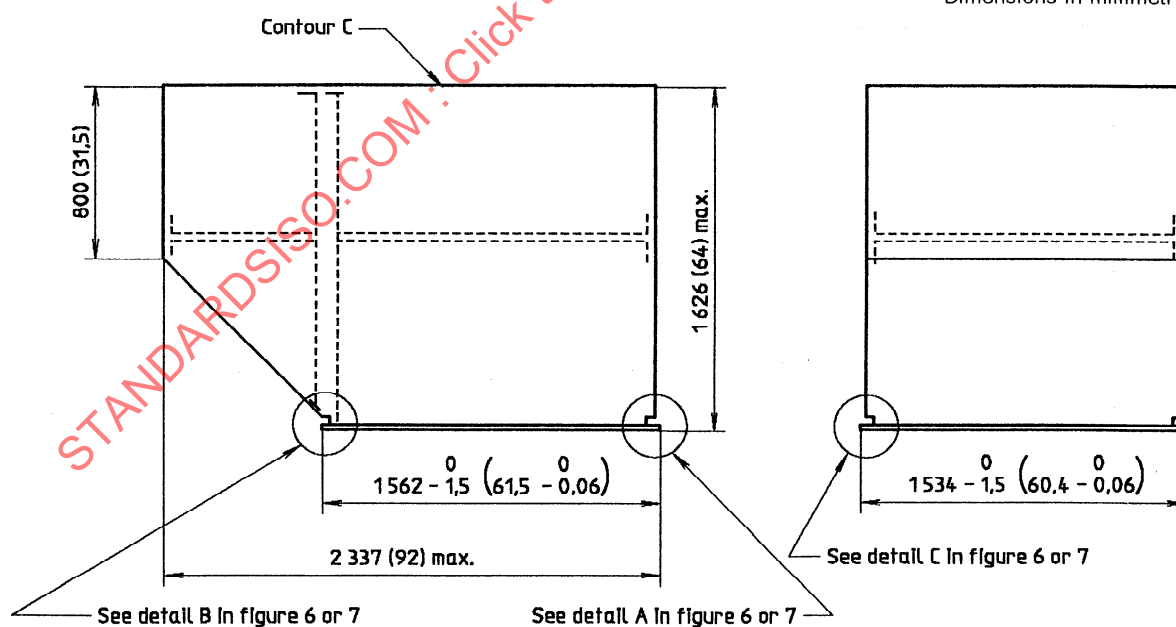
Dimensions in millimetres (inches)



NOTE — Fork-liftable units shall be identified as AKN.

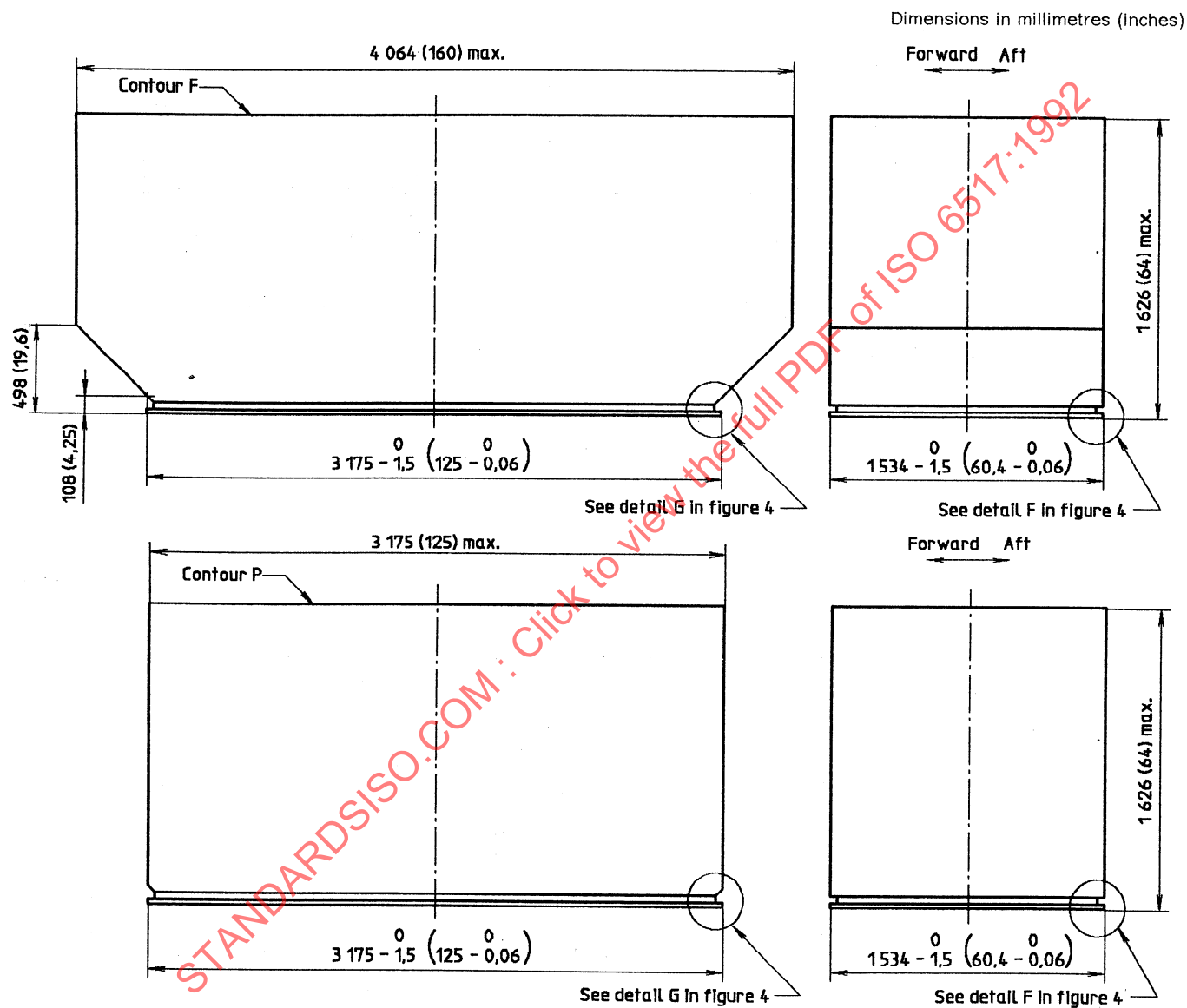
Figure 1 — AKE container

Dimensions in millimetres (inches)



NOTE — Tolerances on base dimensions are for reference only.

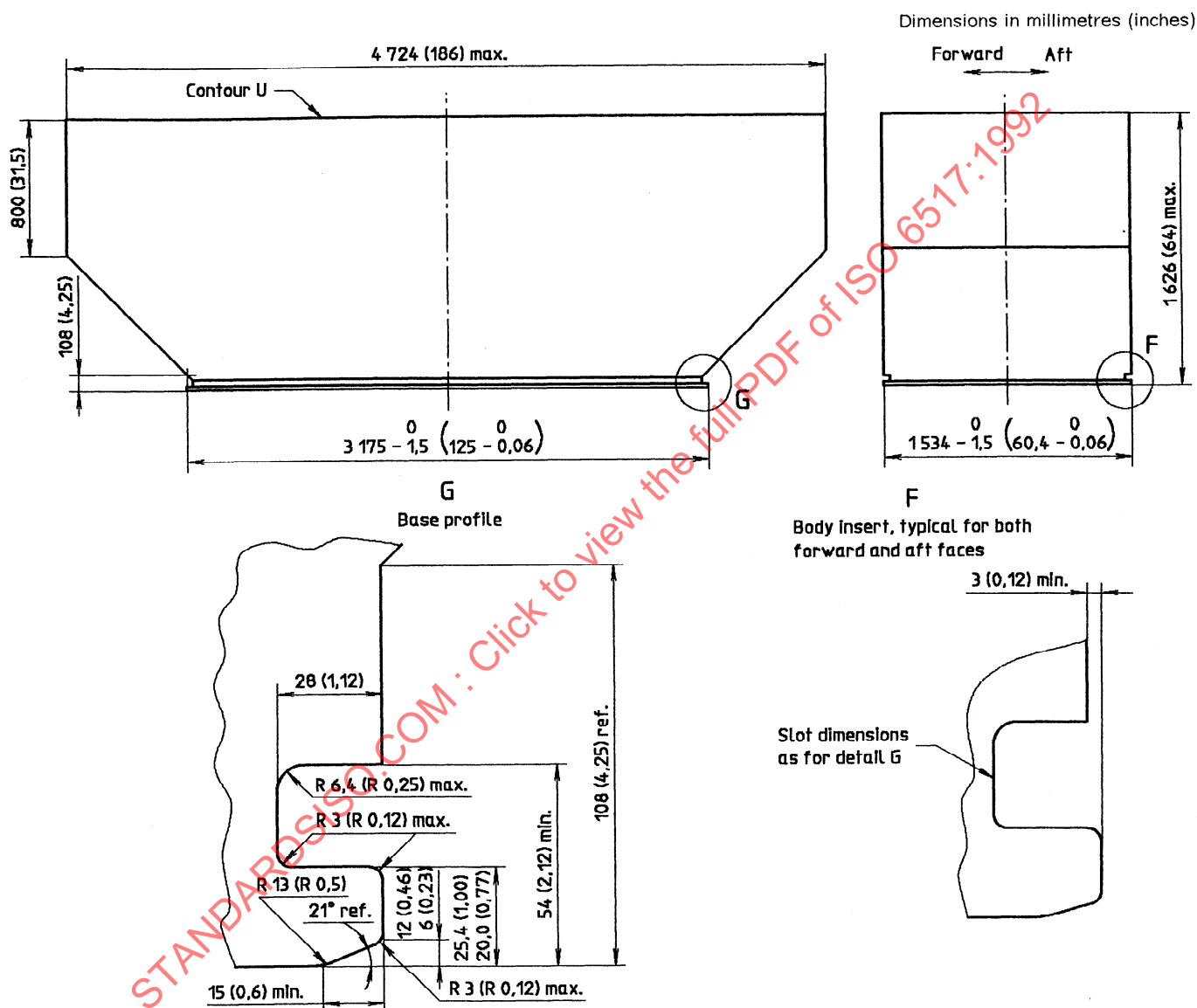
Figure 2 — AKC container



NOTES

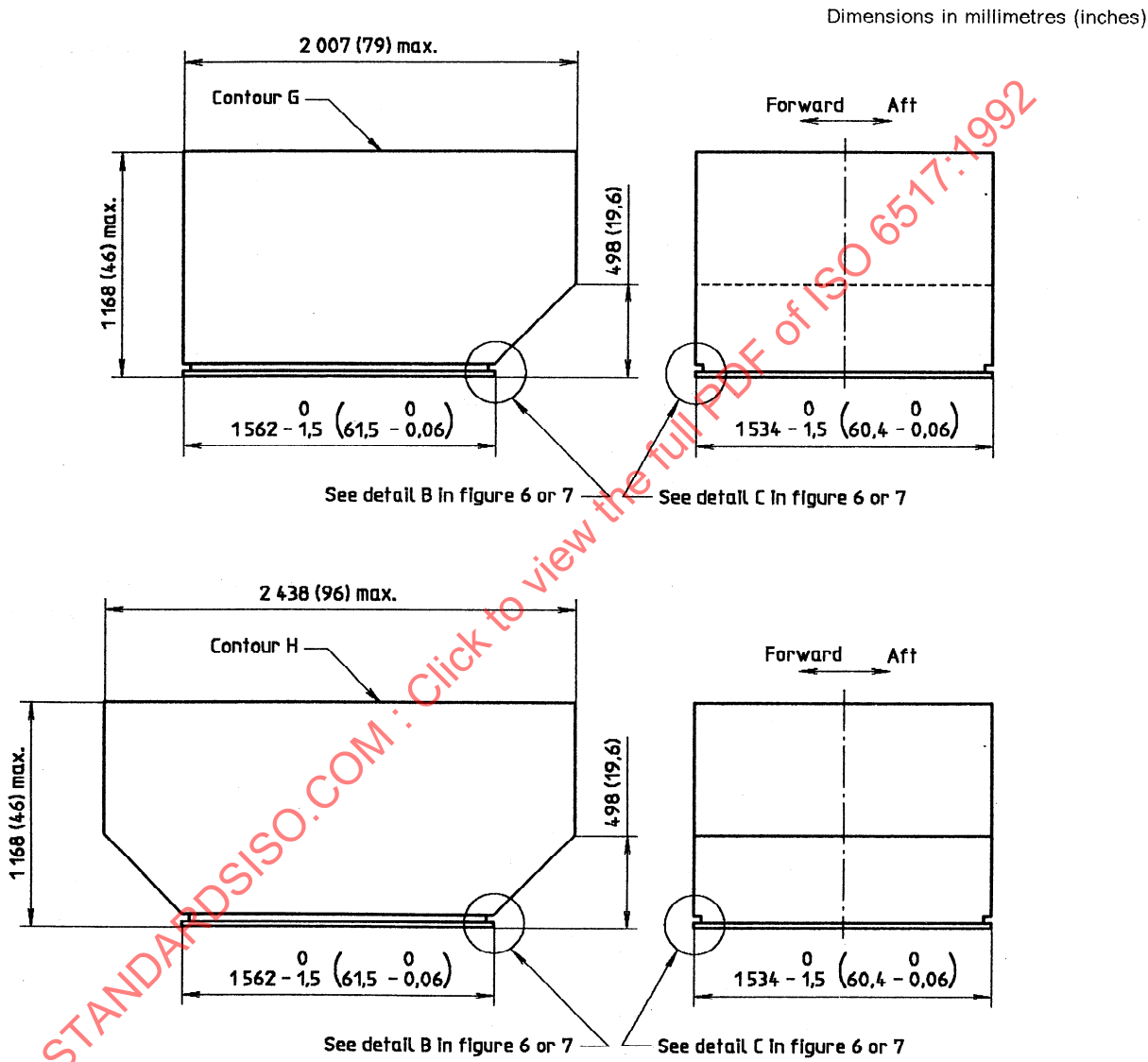
- 1 All 3 175 mm × 1 534 mm (125 in × 60,4 in) bases shall have a corner radius of 50,8 mm (2 in) in the plan view.
- 2 Tolerances on base dimensions are for reference only.

Figure 3 — ALF and ALP containers



NOTE — Tolerances on base dimensions are for reference only.

Figure 4 — ALU container



NOTE — Tolerances on base dimensions are for reference only.

Figure 5 — AKG and AKH containers

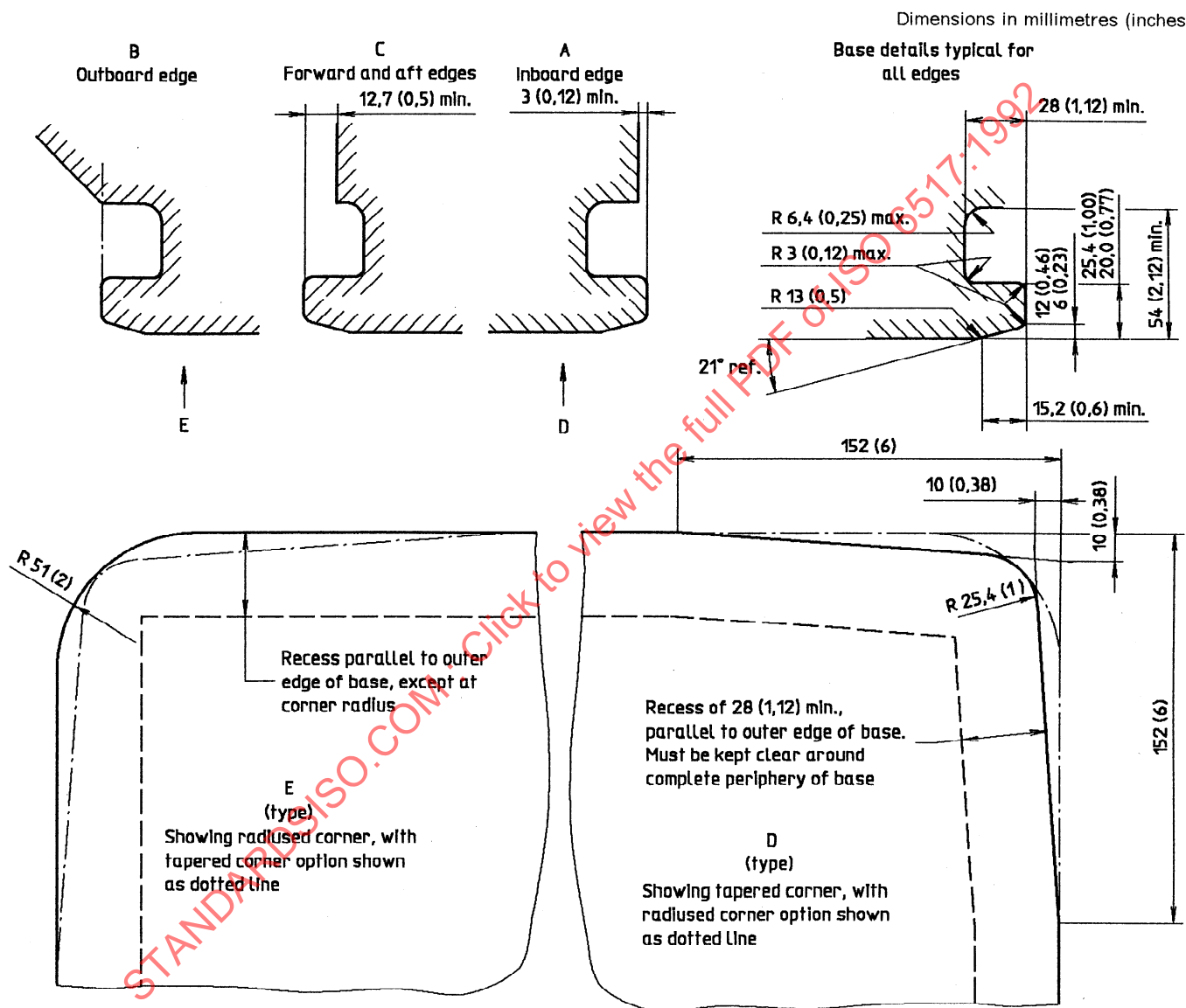


Figure 6 — Container base details — Option A

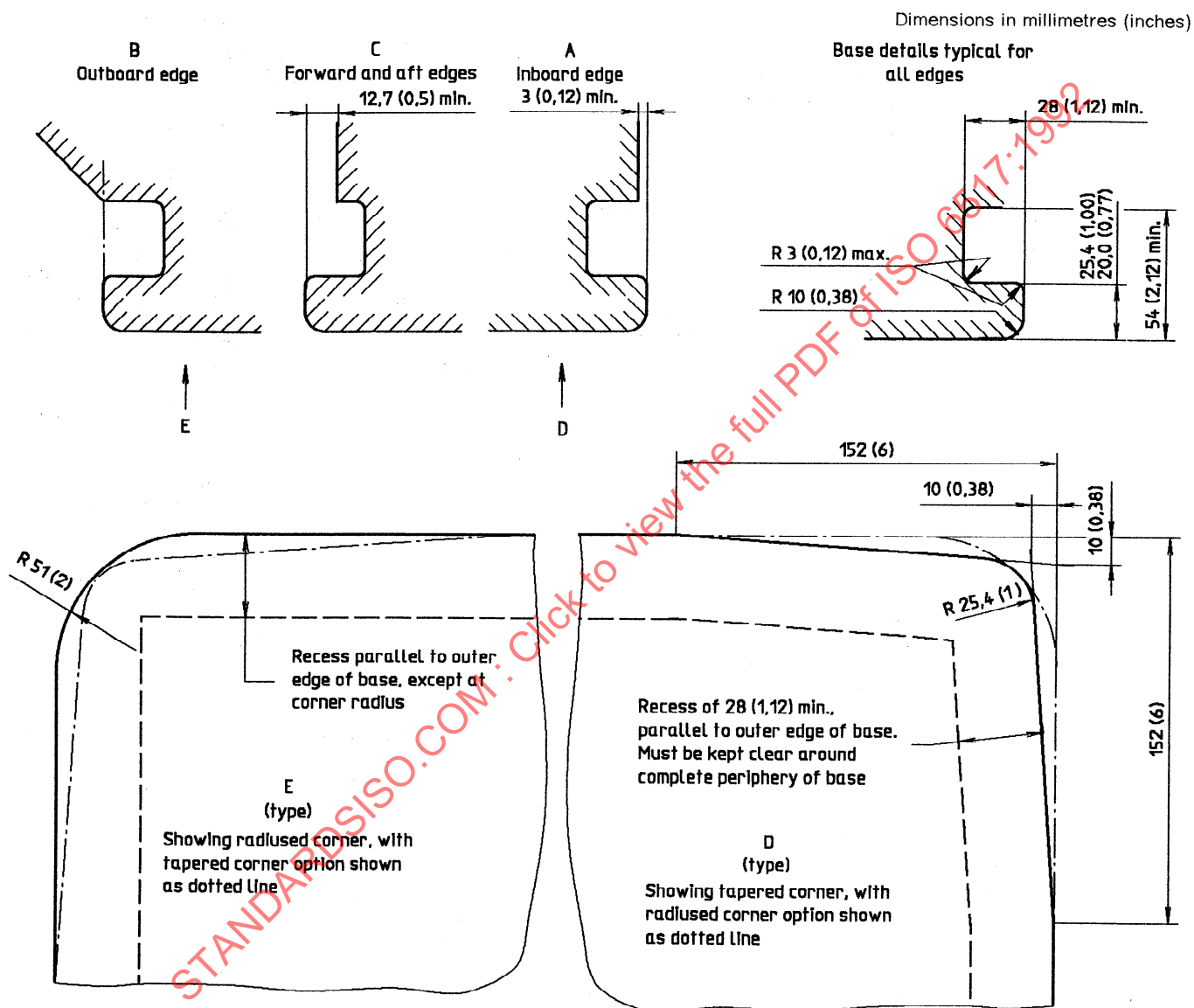


Figure 7 — Container base details — Option B