International Standard 4117

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Air and air-land cargo pallets — Specification and testing

Palettes pour le transport aérien et de surface — 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.

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

Australia	India	Spain
Austria	Italy	Turkey
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France	Romania	
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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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Air and air-land cargo pallets — Specification and testing

0 Introduction

In this International Standard, the minimum essential criteria are expressed by the use of the word "shall". Recommended criteria are expressed by the use of the word "should", and while not mandatory, are considered to be of primary importance in providing serviceable, economical and practical air transport pallets. Deviation from recommended criteria should occur only after careful consideration, extensive testing and thorough service evaluation have shown alternate methods to be satisfactory.

1 Scope and field of application

This International Standard specifies dimensional, structural and environmental requirements for 2,44 m (8 ft) wide pallets to be used in freighter versions of high-capacity fixed wing aircraft and is intended to be compatible with the 2,44 m × 2,44 m (8 ft × 8 ft) cross-section containers described in International Standards for air-land cargo containers. Pallet nets used in conjunction with these pallets are described in ISO 4115.

This International Standard establishes two classes of pallets, type A, air only, and type B air-land.

Pallets will have a nominal width of 2,44 m (8 ft) and nominal lengths of 3 m, 6 m, 9 m and 12 m (10 ft, 20 ft, 30 ft and 40 ft).

Air-only pallets (type A) will normally be handled on aircraft equivalent roller conveying systems and/or on similarly equipped ancillary ground handling devices.

Air-land pallets (type B) are suitable for air-land handling and transport systems. Supplementary requirements for type B pallets are found in clause 4.

2 References

ISO/R 837, *Aircraft seat rails and pins.*[1)]

ISO 4115, *Air-land cargo pallet nets — Specification and testing.*

For airworthiness requirements the following document should be consulted :

USA-FAA — Technical Standard Order (TSO) — C 90 (NAS 3610), Specification for cargo unit-load devices or other appropriate regulatory specifications.

This International Standard also takes into account the following documents :

SAE AS 1130, Specification for air-land cargo pallets.

SAE AS 1131, Specification for air-land cargo pallet nets.

3 Basic requirements

3.1 Dimensions and tolerances

External dimensions of pallets shall be as specified in table 4 and figure 1. Diagonal tolerances shall be as specified in table 5.

3.2 Construction

3.2.1 Pallet construction shall be rugged, weatherproof, minimizing maintenance and original cost by having no moving parts.

3.2.2 All fittings and appurtenances shall be within the maximum outside dimensions of the pallet.

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

3.2.3 Pallet construction shall be of sufficient strength to withstand without permanent deformation the static and dynamic loads and impact shock encountered in normal carrier service.

1) A proposed revision of this Recommendation is being prepared at present.

3.3 Pallet surfaces

3.3.1 The top and bottom surfaces of the pallet shall be parallel, flat and continuous.

Over the entire length of the pallet the bottom surface shall be smooth and shall be a flat plane to within 1,6 mm (0.625 in). This shall allow for a waviness factor from crest to crest having a pitch of 914 mm (36 in) minimum.

3.3.2 No part of the structure shall protrude below the bottom surface.

3.3.3 Construction

3.3.3.1 The pallet edges (length L in figure 1) shall have a nominal thickness of 50,8 mm (2 in), measured from the lower surface. This thickness may be varied when the design employed results in a lighter and more durable structure capable of accepting a uniform loading of 1 950 kg/m^2 (400 lbf/ft^2) when supported on conveying system in accordance with 3.3.3.3.

3.3.3.2 The pallet shall be enclosed on all four sides by an edge member conforming to figures 2, 3 and 4 (4A). The vertical surface of the pallet edge between the restraint provisions shown in figures 2 and 3 shall be smooth and continuous to provide an automatically latching aircraft systems interface.

— The pallet bottom skin shall 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 figures 4 (4A) or 5 (5A).

— The pallet corners shall have a 76,2 mm (3 in) radius in the plane of the pallet.

— Pallet corners should be readily replaceable.

3.3.3.3 The pallet design shall provide for support and ease of movement at the rated distributed load on minimum conveyor systems as described in the following :

— Four rows of rollers approximately equally spaced over a minimum width of 1 930 mm (76 in) measured between centres with each row composed of 38 mm (1.5 in) diameter rollers 76,2 mm (3 in) long, uncrowned, with an edge radius R of 1,4 mm (0.06 in) spaced on 254 mm (10 in) centres. Pallet travel is perpendicular to the roller axis.

— 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. Pallet travel may be in all directions across 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. Pallet travel may be in all directions across grid.

— For design purposes it may be assumed that while supported on these systems and while being transported over a road, the pallet will be subjected to vertical loads of approximately 1,8 g (dynamic) with a frequency of 180 cycles/min and amplitude of 76,2 mm (3 in).

3.3.3.4 The pallet lower surface shall comply with the following conditions :

— Ball indentation in accordance with 5.2.

— Ball castors in accordance with 5.3.

— Abrasion in accordance with 5.4.

3.3.4 Net attachments shall be compatible with the configuration shown in figures 1 and 6.

3.4 Aircraft restraint provisions

Restraint provisions as shown in figures 2, 3 and 4 (4A) shall be provided.

3.5 Complete assembly

3.5.1 A pallet shall be capable of traversing a 2° crest or valley with no permanent deformation or damage.

To meet this condition, pallets uniformly loaded to gross weight[1] shall be capable of being supported at the cresting point over a roller contact of 2,03 m (80 in) minimum width with a roller of 38 mm (1.5 in) maximum diameter.

3.5.2 Pallet construction shall be free of any recesses or voids in which cargo (or other material) can be concealed. To meet agricultural requirements, all pallet surfaces should be as free as possible of recesses and protuberances, where pests can hide, or where soil or other residues can accumulate.

3.5.3 The pallet shall withstand, without permanent deformation, a forklift wheel load of 2 721,5 kg (6 000 lb) on each of two wheels on 762 mm (30 in) centres anywhere on the pallet and 4 082,5 kg (9 000 lb) per wheel within 457,2 mm (1.5 ft) of any edge, while resting on a surface of sufficient strength and continuity to adequately support the pallet.

1) The term "weight" is used throughout this International Standard instead of the correct term "mass", in order to conform to current commercial usage (see clause 7).

3.6 Ratings

3.6.1 The pallet shall be designed to restrain the following gross weights :

3.6.1.1 3 m (10 ft) pallet : 5 670 kg (12 500 lb)

3.6.1.2 6 m (20 ft) pallet : 11 340 kg (25 000 lb)

3.6.1.3 9 m (30 ft) pallet : 15 875 kg (35 000 lb)

3.6.1.4 12 m (40 ft) pallet : 20 410 kg (45 000 lb)

3.6.2 Pallets over 3 m (10 ft) in length shall be designed for a gross weight of 6 760 kg (14 900 lb) in any 3 m (10 ft) section of pallet.

3.7 Design loads

3.7.1 Operational loads

3.7.1.1 Taking a design case where the pallet is supported on a roller system in accordance with 3.3.3.3, the pallet shall be designed for the following operational loads with the cargo centre of gravity located at any point in the range specified in 3.7.6, and under these loads it shall not exhibit any permanent deformation.

3.7.2 Ultimate loads

When the roller system is in accordance with 3.3.3.3, the pallet shall be designed for the following ultimate loads with the cargo centre of gravity located at any point in the range specified in 3.7.6. The pallet may exhibit permanent deformation, but shall not rupture to the extent of discharging cargo.

Table 1 — Operational loads

Pallet length		Maximum unit gross weight		Operational loads									
				Forward		Aft		Side		Up		Down	
m	ft	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
3	10	5 670	12 500	5 670	12 500	5 670	12 500	5 670	12 500	5 670	12 500	17 010	37 500
6	20	11 340	25 000	11 340	25 000	11 340	25 000	11 340	25 000	11 340	25 000	34 020	75 000
9	30	15 875	35 000	15 875	35 000	15 875	35 000	15 875	35 000	15 875	35 000	47 630	105 000
12	40	20 410	45 000	20 410	45 000	20 410	45 000	20 410	45 000	20 410	45 000	61 235	135 000

Table 2 — Ultimate loads

Pallet length		Maximum unit gross weight		Ultimate loads									
				Forward		Aft		Side		Up		Down	
m	ft	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
3	10	5 670	12 500	8 505	18 750	8 505	18 750	8 505	18 750	14 175	31 250	28 350	62 500
6	20	11 340	25 000	17 010	37 500	17 010	37 500	17 010	37 500	28 350	62 500	56 700	125 000
9	30	15 875	35 000	23 815	52 500	23 815	52 500	23 815	52 500	36 690	87 500	79 380	175 000
12	40	20 410	45 000	30 620	67 500	30 620	67 500	30 620	67 500	51 030	112 500	102 060	225 000

3.7.3 All loads are mutually exclusive except that a down load equal to the maximum unit gross weight may be considered to act concurrently with the forward, aft and side loads.

3.7.4 Up, fore and aft loads, shall be restrained by a fitting inserted in the restraint slots, as shown in figures 3 and 4 (4A).

3.7.4.1 The number of slots to be provided with restraint fittings shall be as follows :

3.7.4.1.1 3 m (10 ft) pallet : 2 slots

3.7.4.1.2 6 m (20 ft) pallet : 5 slots

3.7.4.1.3 9 m (30 ft) pallet : 8 slots

3.7.4.1.4 12 m (40 ft) pallet : 11 slots

3.7.4.2 The ultimate fore and aft load for any slot shall be 8 505 kg (18 750 lb).

3.7.4.3 The fore and aft load bearing slots shall be considered to be either on one or both sides of the pallet.

3.7.4.4 Up load shall be restrained by a fittings as shown in figure 15 inserted in the side retraint slots.

The pallet shall be designed to be restrained against vertical loads by between 50 % and 60 % of the total number of slots equally distributed on each side.

3.7.5 End slots shall be provided in accordance with figure 2.

Slots shall be designed to restrain a 3 m (10 ft) pallet for ultimate forward, aft and vertical up loads when used in conjunction with restraint fittings in accordance with figure 13.

3.7.6 The centre of gravity shall be assumed to vary by :

3.7.6.1 ± 10 % of the pallet width measured from the centreline.

3.7.6.2 ± 5 % of the pallet length measured from the centreline.

3.7.6.3 1,2 m (48 in) vertically measured from pallet bottom surface.

3.7.6.4 To achieve the above asymmetric conditions, cargo density shall be assumed to vary linearly.

3.7.7 Each of the four base corners of the pallets shall be capable of resisting 8 505 kg (18 750 lb) load in either the longitudinal or lateral direction.

3.7.8 The cargo net attachment fittings shall include provision for attaching a cargo tie down fitting, each being capable of resisting a 2 268 kg (5 000 lb) ultimate load in any direction.

4 Supplementary requirements for air-land pallets

4.1 Pallets type B

4.1.1 Type IB shall incorporate fittings at the four corners conforming to figures 9 or 10.

4.1.2 Type IIB are 3 m (10 ft) and 6 m (20 ft) pallets only and shall incorporate forklift tineways located in accordance with figure 12 and fittings at the four corners conforming to figures 9 or 10.

4.2 Design ground operational loads (dynamic)

4.2.1 For design purposes, using the following operational design load criteria, a type B pallet base, supported at the corner fittings, and being transported over a road, will be considered to be subjected to these loads at a frequency of 180 cycles/min and an amplitude of 7,62 mm (3 in).

4.2.1.1 3 m (10 ft) pallet : 10 205 kg (22 500 lb)

4.2.1.2 6 m (20 ft) pallet : 20 410 kg (45 000 lb)

4.2.1.3 9 m (30 ft) pallet : 28 575 kg (63 000 lb)

4.2.1.4 12 m (40 ft) pallet : 36 740 kg (81 000 lb)

4.2.2 For surface transport, ISO type adapter fittings or other separator means should be attached to the corner fittings because of the flat bottom configuration.

4.3 Ground operational loads (static)

Table 3 — Ground operational loads

Pallet length		Maximum unit gross Weight		Ground operational loads	
m	ft	kg	lb	kg	lb
3	**10**	5 670	12 500	11 340	25 000
6	**20**	11 340	25 000	22 680	50 000
9	**30**	15 875	35 000	31 750	70 000
12	**40**	20 410	45 000	40 825	90 000

4.3.1 Type B pallets shall be capable of withstanding, without permanent deformation, a uniformly distributed down load equal to those specified in 4.2, while supported by slings or a frame connected to the four corner fittings.

4.3.2 Type IIB pallets shall be capable of withstanding a down load equal to those specified in 4.3, while supported by a forklift truck.

4.3.3 Each of the four corners shall be capable of reacting at least an 8 505 kg (18 750 lb) load in either the longitudinal or latitudinal direction.

4.4 The pallet edges (length L in figure 1) shall have a minimum thickness of 139,7 mm (5.5 in) measured from the lower surface.

5 Environmental criteria

5.1 Materials

5.1.1 The pallet should be designed and built using materials which will provide maximum serviceability and protection of contents under the intended environmental conditions.

5.1.2 The structural and operational integrity of the pallet shall be maintained in a temperature range of − 55 to + 70 °C (− 65 to + 160 °F).

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

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

5.2 Ball load capability

The pallet base surface or a representative portion thereof shall be subjected to a load of 408 kg (900 lb) transmitted via a steel ball of 25,4 mm (1 in) diameter without exhibiting permanent indentation in excess of 0,51 mm (0,020 in).

5.3 Ball castor load capability

The base or a representative portion thereof shall be subjected to a uniformly distributed load of 99,5 kg (210 lb), supported by four 25,4 mm (1 in) diameter steel ball castors on a 127 mm × 127 mm (5 in × 5 in) grid pattern. The base shall be moved over the castors 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 305 mm (12 in). At the conclusion of the test, there shall be no evidence of deterioration of the base/ball castor interface surface.

5.4 Abrasion resistance of plastic coated or magnesium-base materials.

Three samples of the pallet base assembly material shall be subjected to a test method equivalent to that given in the annex (to be added later).

The abrasion wheel shall be dressed every 1 000 cycles. A CS-10 wheel with a load of 500 grams shall be used for all tests. The average of weight loss shall not exceed the following values :

- after 1 000 revolutions : 0,015 grams;
- after 2 000 revolutions : an additional 0,005 grams;
- after 5 000 revolutions : an additional 0,030 grams; up to a total of 0,050 grams.

5.5 Weight limits

The tare weight of the pallet assembly shall be a minimum consistent with the requirements of this International Standard and within the limits of sound design practices.

5.6 Materials and processes

5.6.1 The materials and processes used in the construction should give consideration to the external hard usage to which the pallet will be subjected to provide for maximum service life. All metal parts should be suitably protected against corrosion. All non-metallic materials which are liquid absorbent should be sealed or treated to prevent liquid absorption.

5.6.2 The materials used shall be flame resistant in accordance with appropriate regulatory requirements.

5.6.3 All fasteners should be of aircraft standard and the number of sizes, styles and strengths shall be kept to a minimum. No slotted head screws shall be used.

6 Testing requirements

6.1 Scope

The methods of testing described are intended to demonstrate that the pallet meets the design requirements.

6.1.1 The tests are static in nature to minimize the complexity and cost of the required testing facilities. As far as is practicable, the applied static loads should take into account the combined static and dynamic loads anticipated in service.

6.1.2 It is intended that tests shall be non-destructive in nature and shall not result in damage to the pallet unless ultimate load conditions are employed.

6.1.3 Test equipment and the methods of testing described are meant to demonstrate that the pallet meets the requirements of this International Standard. Other equivalent methods may be employed to obtain the desired result.

6.1.4 In selected cases, tests may be repeated under ultimate load conditions when required for substantiation of analytical data. If this becomes necessary, the pallet so tested may not be used in service unless all its component parts have been inspected and those that exhibit permanent deformation have been replaced.

6.2 Test criteria

6.2.1 A pallet shall be considered satisfactory if, upon inspection before and after testing, its dimensions fall within those specified in tables 4 and 5 and in the applicable manufacturing drawings.

6.2.2 Permanent deformation, if evident, is acceptable at completion of testing to show that the ultimate loads can be restrained, but there shall be no failure to the extent that allows discharge of cargo or allows the pallet to break free from the restraint system.

6.3 Recommended test equipment

6.3.1 When restraint or movement on an aircraft system is evaluated, the test system shall be in accordance with 3.3.3.3. Latches and guide-rails of suitable strength shall be provided to secure the pallet at its latch points and guide it along the conveyor. The test system shall be of sufficient length to permit cycling of the longest pallet to be tested.

6.3.2 When conducting a structural test, sufficient payload to meet test load requirements shall be provided. Where appropriate, water may constitute the payload, or load producing devices may be used.

6.3.3 An industrial truck or equivalent equipment capable of supporting a maximum load of 5 440 kg (12 000 lb) on one axle, with a minimum wheel width of 178 mm (7 in) and a maximum footprint area of 142 cm^2 (22 in^2) per wheel on 762 mm (30 in) wheel centres shall be provided.

6.3.4 A net in accordance with ISO 4115 shall be provided.

6.3.5 For type B pallets, a crane or lifting means with capacity to lift twice the gross weight of the loaded pallet shall be provided. Sufficient height shall exist under the hook to permit positioning of the pallet vertically on either side or end. Bridle chains, cables or spreaders with capacity to lift the loaded pallet at the four corners together with appropriate capacity hooks or shackles shall be provided.

6.4 Test procedure — Operational loads

6.4.1 Test No. 1 — Lifting

6.4.1.1 Type B pallets : load to twice the gross weight and lift vertically from the four corner fittings. After lifting, allow the pallet to remain suspended for not less than 5 min and then lower it to the ground. No permanent deformation shall occur.

6.4.1.2 Type IIB pallets : load to twice the gross weight and lift clear of the ground by using a forklift truck of suitable capacity. After lifting, allow the pallet to remain suspended for not less than 5 min and then lower it to the ground. No permanent deformation shall occur.

6.4.2 Test No. 2 — Pallet strength

6.4.2.1 The base of the pallet undergoing the test shall rest on a surface of sufficient strength and continuity to adequately support the pallet. Manoeuvre an industrial forklift truck, loaded to an axle weight of not less than 5 440 kg (12 000 lb) (including the weight of the truck) or 2 722 kg (6 000 lb) per wheel applied to a contact area of not more than 142 cm^2 (22 in^2) [assuming a wheel width of not less than 178 mm (7 in) and wheel centres 762 mm (30 in) apart], over the entire pallet top surface to load the pallet to maximum gross weight. Then manoeuvre an industrial forklift truck, loaded to 4 082 kg (9 000 lb) per wheel, over the area extending 457,2 mm (1.5 ft) from any edge.

No permanent deformation or failure shall occur.

6.4.2.2 While retained on the aircraft loading system or its equivalent, load the pallet uniformly to 5 864 kg/m^2 (1 200 lb/ft^2). The load shall be applied over an area 1,52 m (5 ft) wide centred in the pallet and the load shall equal but not exceed three times the maximum payload.

No permanent deformation or failure shall occur.

6.4.2.3 The pallet under test shall be latched to the aircraft system or its equivalent. The number of latches specified in 3.7.4.1 shall be engaged on one side and adjusted by suitable means to ensure contact with the end of the latch receptacle slot. With a net in accordance with ISO 4115 attached to the pallet, apply a uniformly distributed load equal to the gross weight to one 2,44 m (96 in) wide end of the net. The centre of gravity of the load shall be 1,2 m (48 in) vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 3.7.6.

No permanent deformation or failure shall occur.

For 3 m (10 ft) pallets, the test specified in 6.4.2.3 using only restraints in fore and aft slots in accordance with figure 13.

6.4.2.4 With the pallet on the aircraft system or its equivalent, 50 to 60 % of all the latches per figure 15, equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure vertical restraint. With a net in accordance with ISO 4115 attached to the pallet, apply a uniformly distributed load equal to the gross weight to one side of the net. The centre of gravity of the load shall be 1,2 m (48 in) vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 3.7.6.

No permanent deformation or failure shall occur.

6.4.2.5 Suspend the pallet upside down under the aircraft loading system or its equivalent. Between 50 % and 60 % of the total number of latches, equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure contact when the load is applied. The pallet shall support a load equal to the gross weight, uniformly distributed, and tied down with a net complying with ISO 4115.

No permanent deformation or damage shall occur.

6.4.2.6 Repeat the test specified in 6.4.2.5 for 3 m (10 ft) pallets, using only restraint in accordance with figure 13.

6.4.2.7 The pallet shall be uniformly loaded to gross weight and cycled one hundred times over a substantially level test system per 3.3.3.3 at a minimum speed of 18,3 m/min (60 ft/min).

6.4.2.7.1 The test section shall be supported on a rigid, welded steel, wood or concrete structure.

6.4.2.7.2 The rollers used in the test section shall conform to 3.3.3.3. The shell of the roller shall be of high quality aluminium alloy. The bearings used in the rollers shall be selected so as to ensure that the coefficient of friction of the test system does not exceed 0,02 at 1,0 g loading.

6.4.2.7.3 The maximum displacement of the tops of the rollers from a theoretical plane should be varied randomly to a maximum of ± 0,76 mm (± 0.03 in).

6.4.2.7.4 Each cycle shall be equal to twice the pallet length.

6.4.2.7.5 At test speed, draw-bar pull shall be recorded during the first and last cycle. The maximum allowable draw-bar pull shall be 3 % of the gross weight. The maximum variation of the draw-bar pull from the first to the last cycle shall not exceed 0,05 % of the gross weight.

6.4.2.8 Attachment receptacle test

6.4.2.8.1 Cargo tie down

A two stud bulk tie down fitting shall be used to fit a receptacle in accordance with ISO/R 837. With the pallet latched to the aircraft system or its equivalent, 50 to 60 % of all the latches, equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure vertical restraint. Test the pallet receptacle by applying a 2 268 kg (5 000 lb) tensile load in all directions from the horizontal to the vertical. The load application point shall be 20 mm (0.83 in) or less from the head of the stud.

6.4.2.8.2 Net attachment

A one stud net attachment fitting in accordance with ISO/R 837 shall be engaged in the net attachment receptacle complying with ISO/R 837. Test the pallet receptacle by applying a 1 361 kg (3 000 lb) tensile load in all directions, from the horizontal to the vertical. The load application point shall be 20 mm (0.083 in) or less from the head of the stud.

6.4.2.9 For type B pallets while supported at the four corners proceed as follows :

Repeat test 6.4.2.1.

Load the pallet as specified in 4.2.1.

No permanent deformation or damage shall occur.

6.4.3 Subject any parts that cannot be adequately protected against corrosion to a test, duplicating the anticipated environment. Subsequent corrosion shall not preclude the parts from performing their design functions or cause failure of the pallet during the design life of the pallet.

6.4.4 Place the pallet, empty, in a suitable test chamber at 70 °C (160 °F) ambient temperature for 48 h.

6.4.4.1 At the end of 48 h, evaluate its condition while the structure is at or near test temperature.

6.4.4.2 Place the pallet, empty, in a suitable test chamber at − 55 °C (− 65 °F) ambient temperature for 48 h.

6.4.4.3 At the end of 48 h, evaluate its condition while the structure is at or near the test temperature.

6.5 Production pallets

To show compliance with its specification standard, commercial inspection and quality control methods and practices shall be used to ensure that production units are not inferior to the article tested. Where changes are made to production units and product similarity cannot be clearly established, the first product so changed shall be retested to show compliance with its specification.

7 Marking requirements

7.1 All pallets covered by this International Standard shall be marked in accordance with the following minimum requirements. The markings shall be permanently engraved on the top surface, not more than 25,4 mm (1 in) from the outer edge of the aircraft pallet. The engraving should be positioned on two sides diagonally opposite to one another within 300 mm (12 in) of the corner.

Actual weight, tare . . . . . kg . . . . . lb

Maximum gross weight . . . . . kg . . . . . lb

The letters and numbers shall not be less than 4,83 mm (0.19 in) high.

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

7.2 The following additional manufacturer's markings shall be permanently indicated on the top surface not more than 25,4 mm (1 in) from the outer edge of the aircraft pallet. The letters and numbers shall not be less than 4,83 mm (0.19 in) high.

Manufacturer.....
(Name) (Country)

Part number.....

Table 4 — Pallet dimensions[1)]

Overall length L		Overall width W		Minimum thickness	Dimensions							
					A		B		C		D	
mm	in	mm	in		mm	in	mm	in	mm	in	mm	in
$12\,192\ ^{0}_{-9,5}$	$480\ ^{0}_{-3/8}$	$2\,438\ ^{0}_{-4,8}$	$96\ ^{0}_{-3/16}$	2)	239,27	9,42	391,92	15,43	238,00	9,37	419,10	16,50
$9\,125\ ^{0}_{-9,5}$	$359\ 1/4\ ^{0}_{-3/8}$	$2\,438\ ^{0}_{-4,8}$	$96\ ^{0}_{-3/16}$	2)	239,27	9,42	391,92	15,43	238,00	9,37	429,26	16,90
$6\,058\ ^{0}_{-6,4}$	$238\ 1/2\ ^{0}_{-1/4}$	$2\,438\ ^{0}_{-4,8}$	$96\ ^{0}_{-3/16}$	2)	239,27	9,42	391,92	15,43	238,00	9,37	432,31	17,02
$2\,991\ ^{0}_{-4,8}$	$117\ 1/4\ ^{0}_{-3/16}$	$2\,438\ ^{0}_{-4,8}$	$96\ ^{0}_{-3/16}$	2)	239,27	9,42	391,92	15,43	238,00	9,37	418,34	16,47

1) See figure 1 for dimension locations.

2) For type A : 50,8 mm (2.0 in);
For type B : 139,7 mm (5.5 in).

Table 5 — Diagonal tolerances — Type B pallets

Overall length		S		P		K_1max.	
mm	in	mm	in	mm	in	mm	in
12 192	480	11 988,8	471	2 260,6	89	19	3/4
9 125	359 1/4	8 921,7	351 1/4	2 260,6	89	15,9	5/8
6 058	238 1/2	5 848,4	230 1/4	2 260,6	89	12,7	1/2
2 991	117 3/4	2 787,6	109 3/4	2 260,6	89	9,5	3/8

$K_1 = D_1 - D_2$

For locations of S, P and D see figure 11.

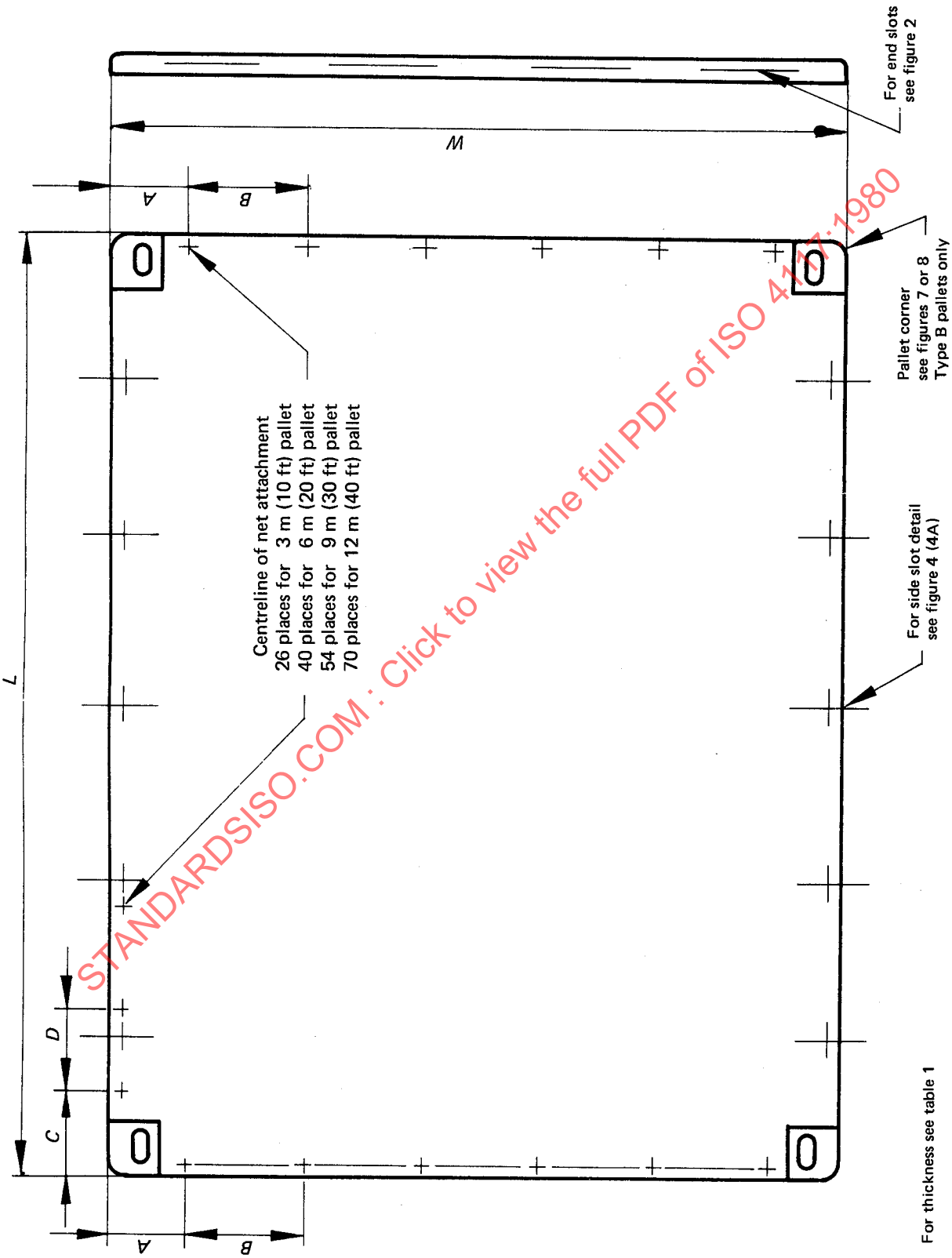


Figure 1 — Pallet dimensions (see table 4)

Dimensions in millimetres
(Dimensions in inches in parentheses)

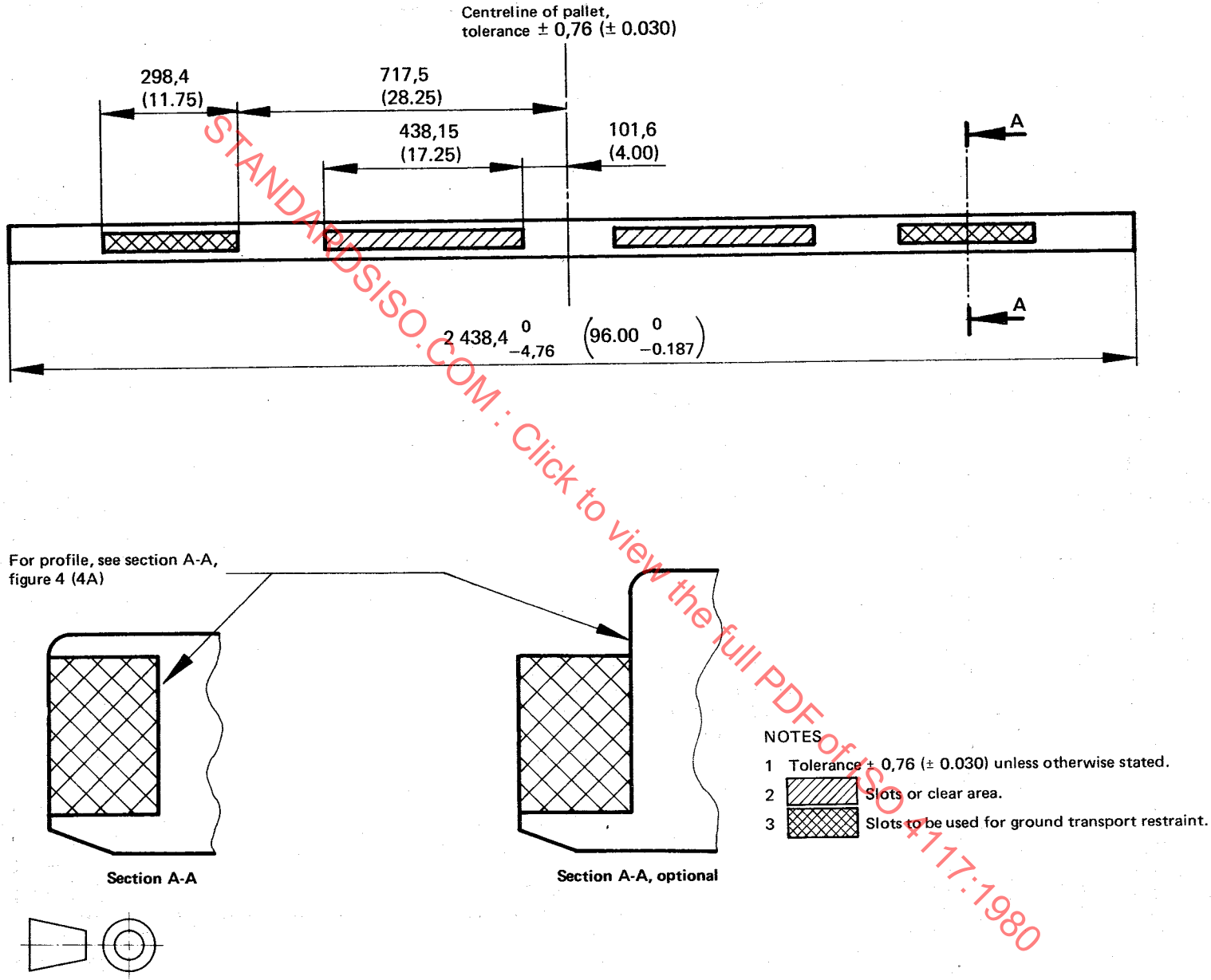


Figure 2 — End slots or blocks (both sides)

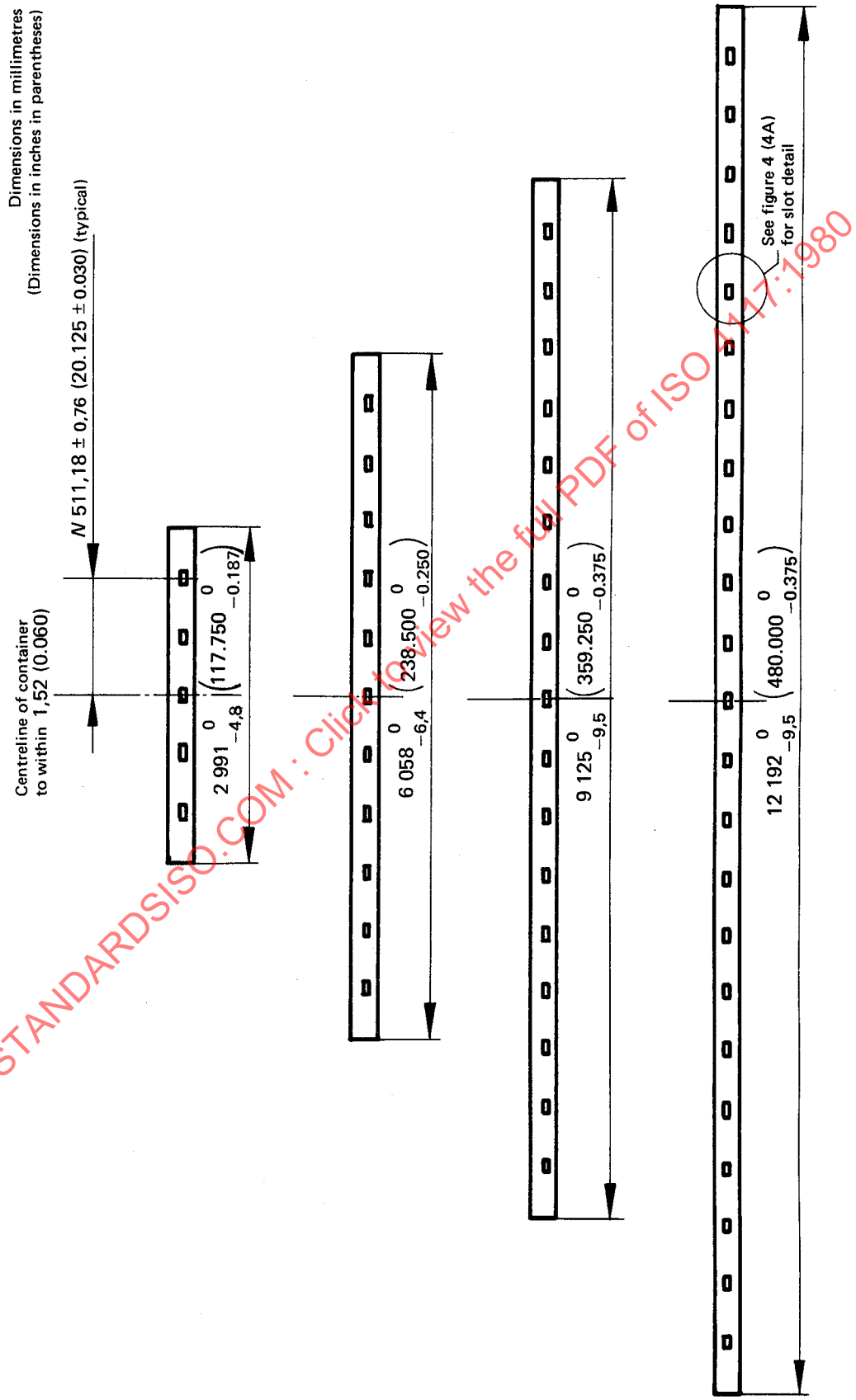


Figure 3 — Side restraint slots location

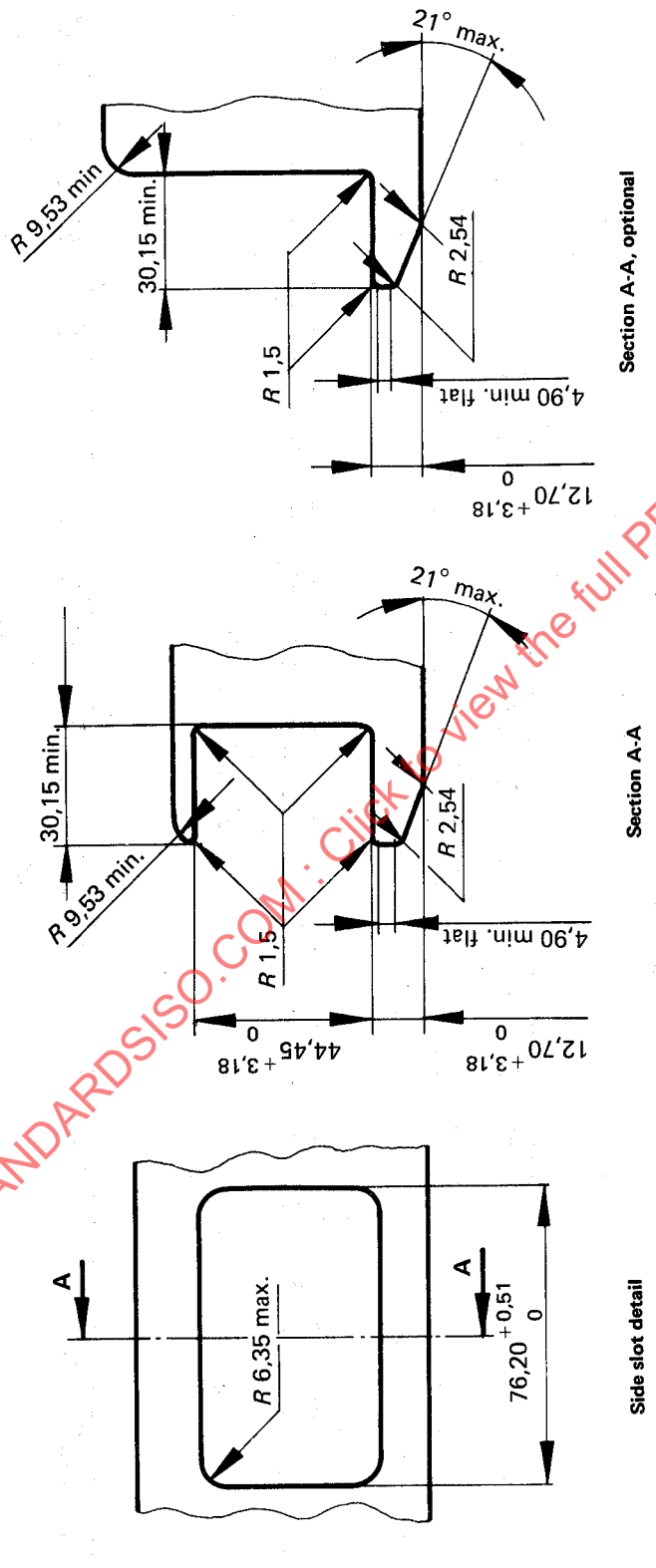


Figure 4 — Side slot detail — Dimensions in millimetres

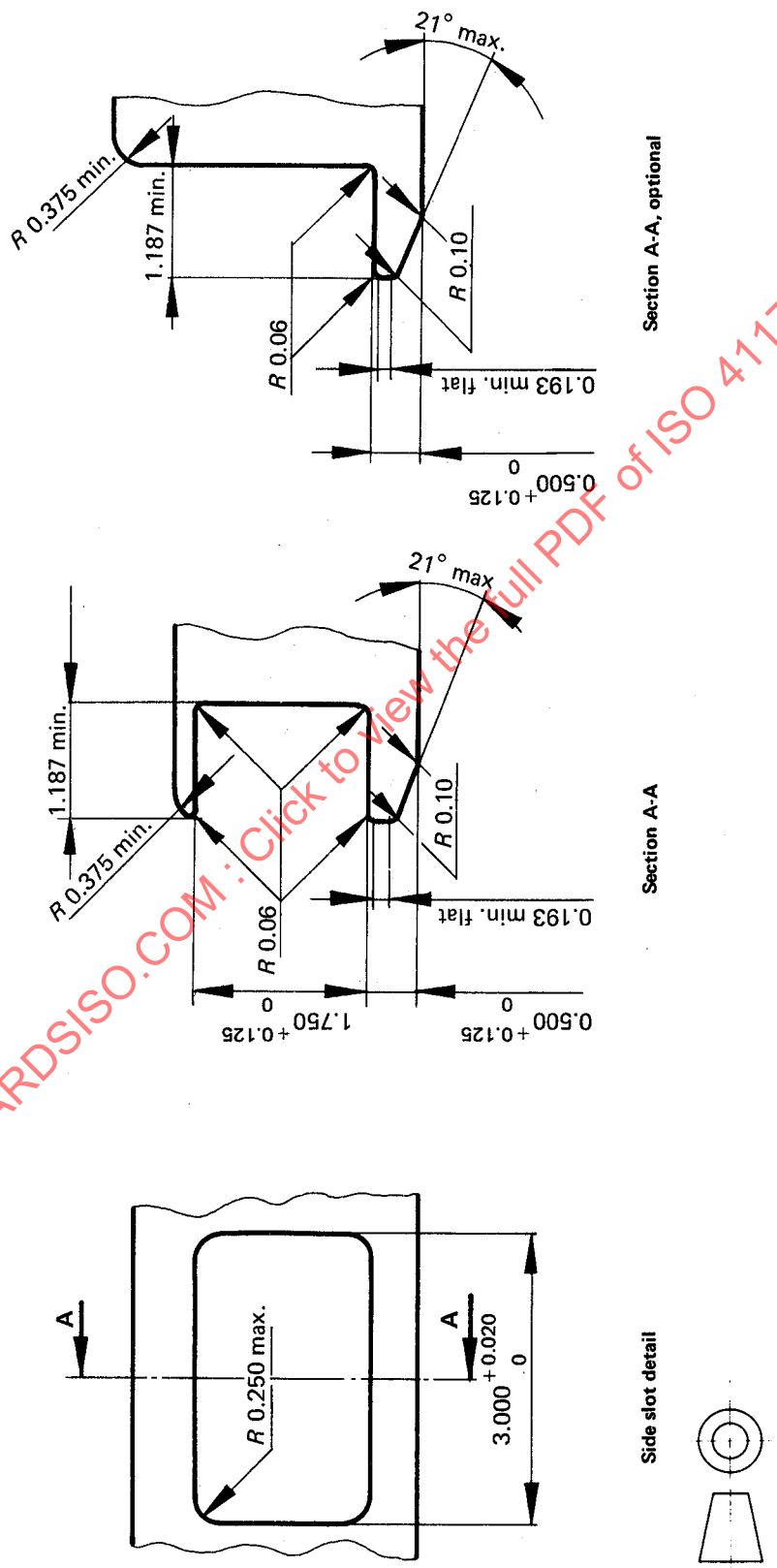


Figure 4A — Side slot detail — Dimensions in inches

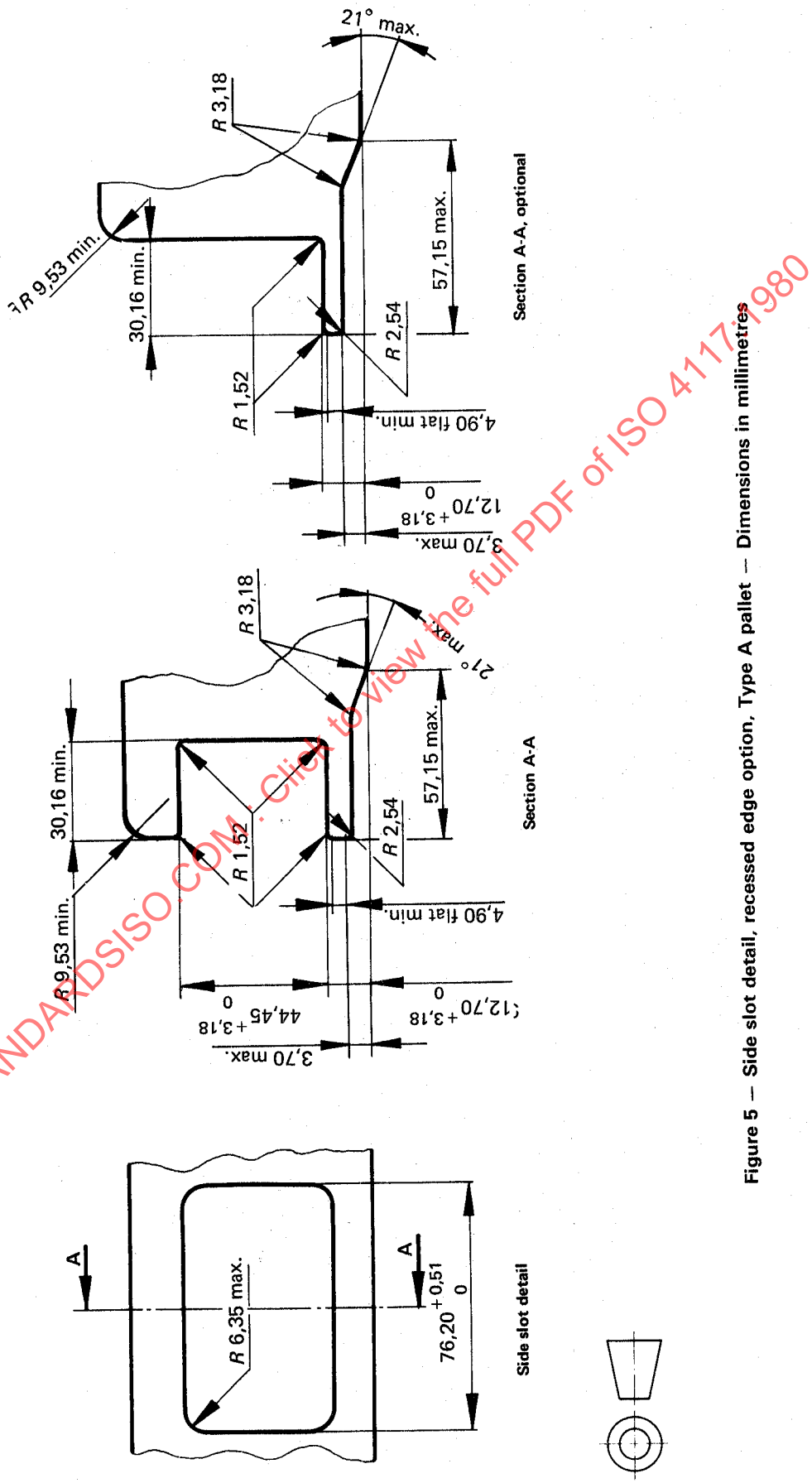


Figure 5 — Side slot detail, recessed edge option, Type A pallet — Dimensions in millimetres

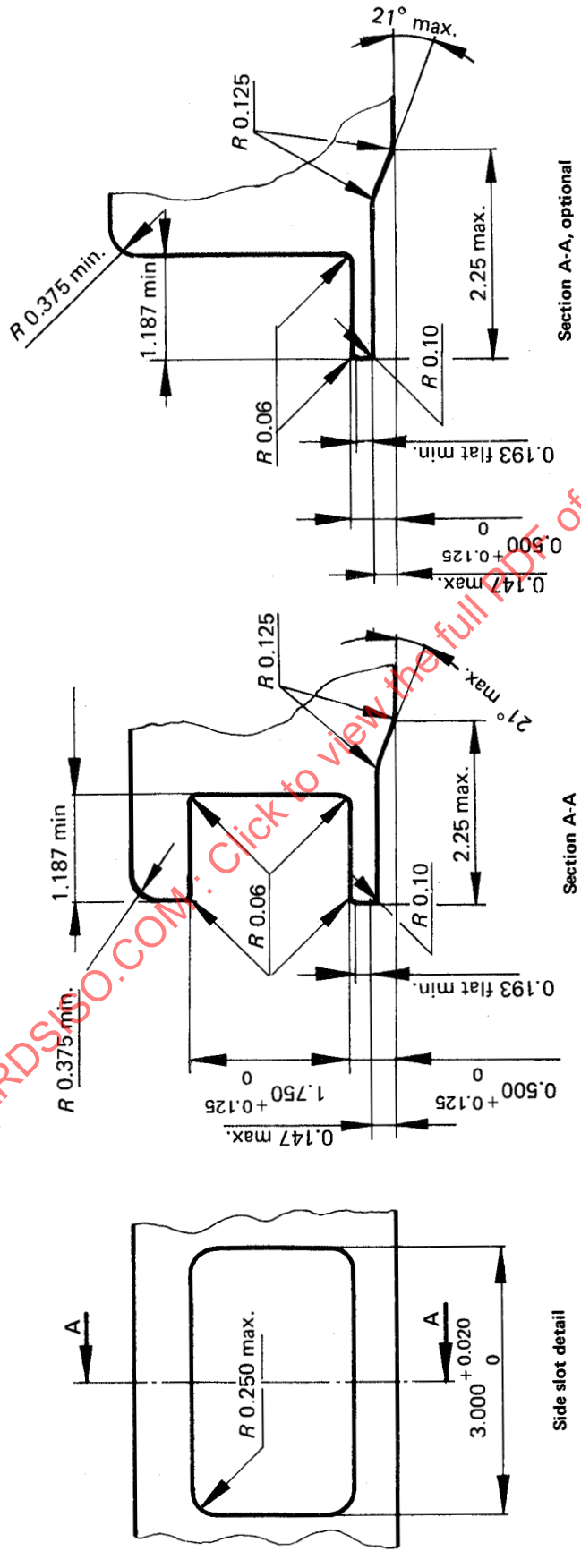


Figure 5A — Side slot detail, recessed edge option, Type A pallet — Dimensions in inches

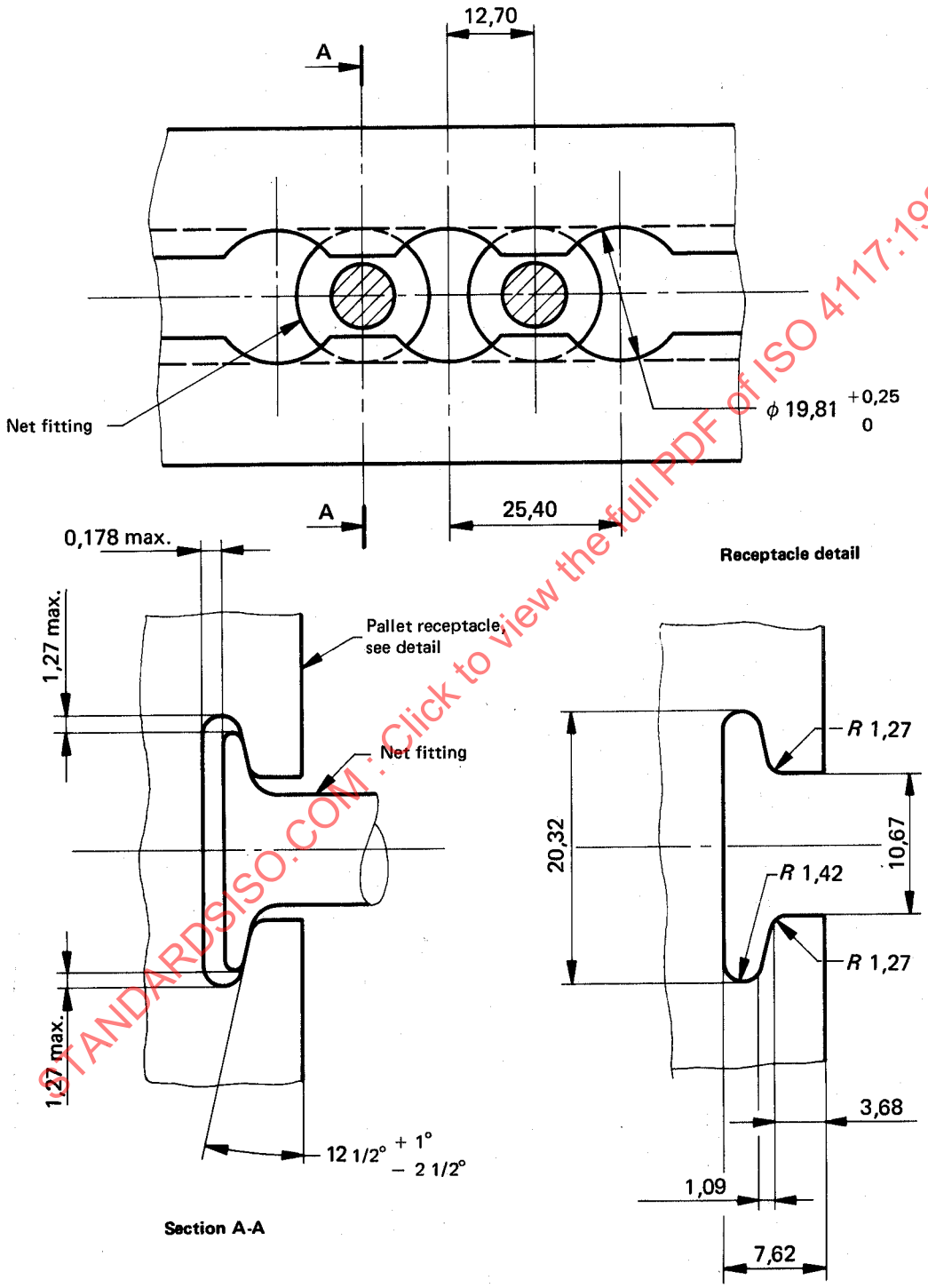


Figure 6 — Cargo net tie-down receptacle — Dimensions in millimetres

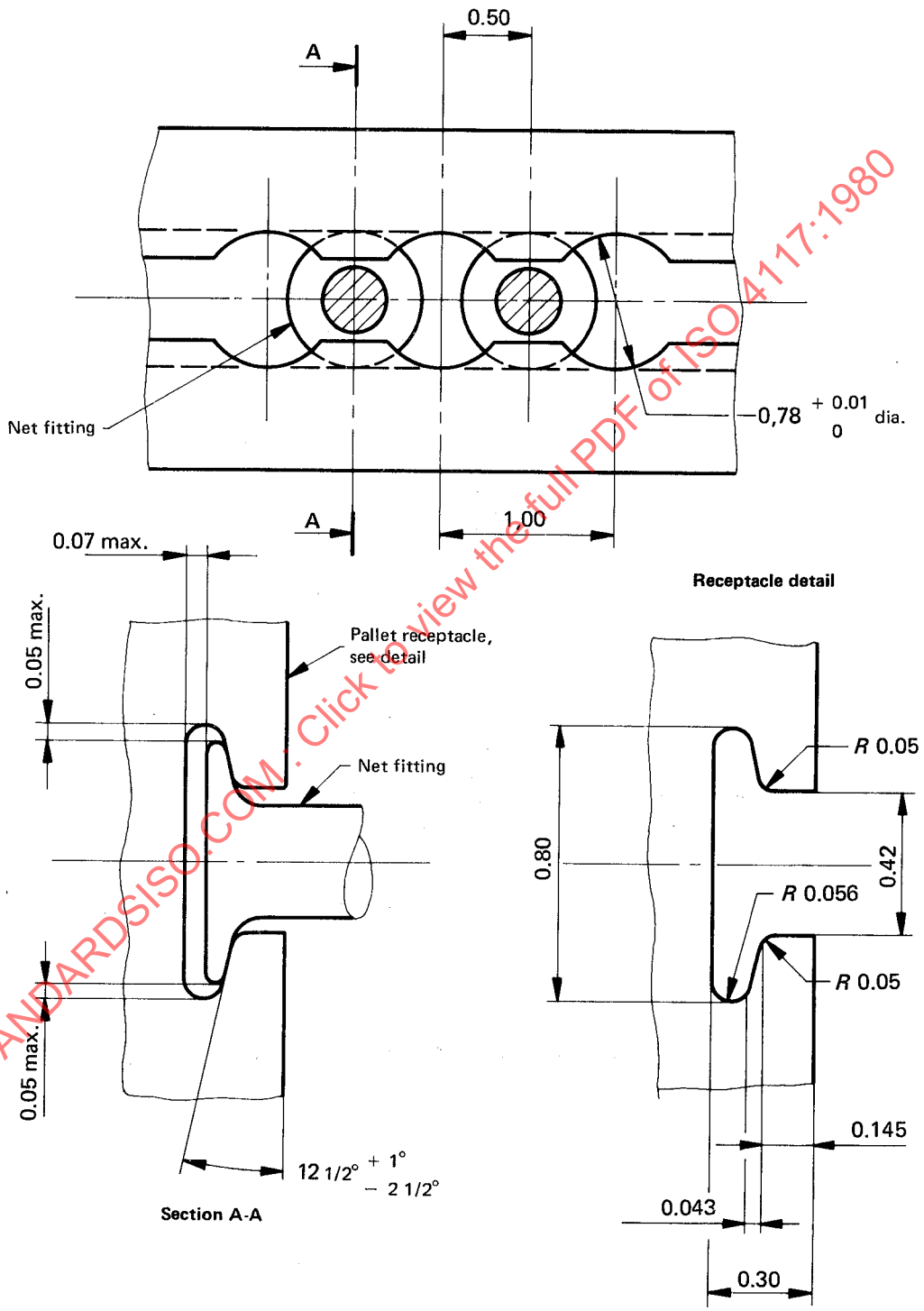


Figure 6A — Cargo net tie-down receptacle — Dimensions in inches

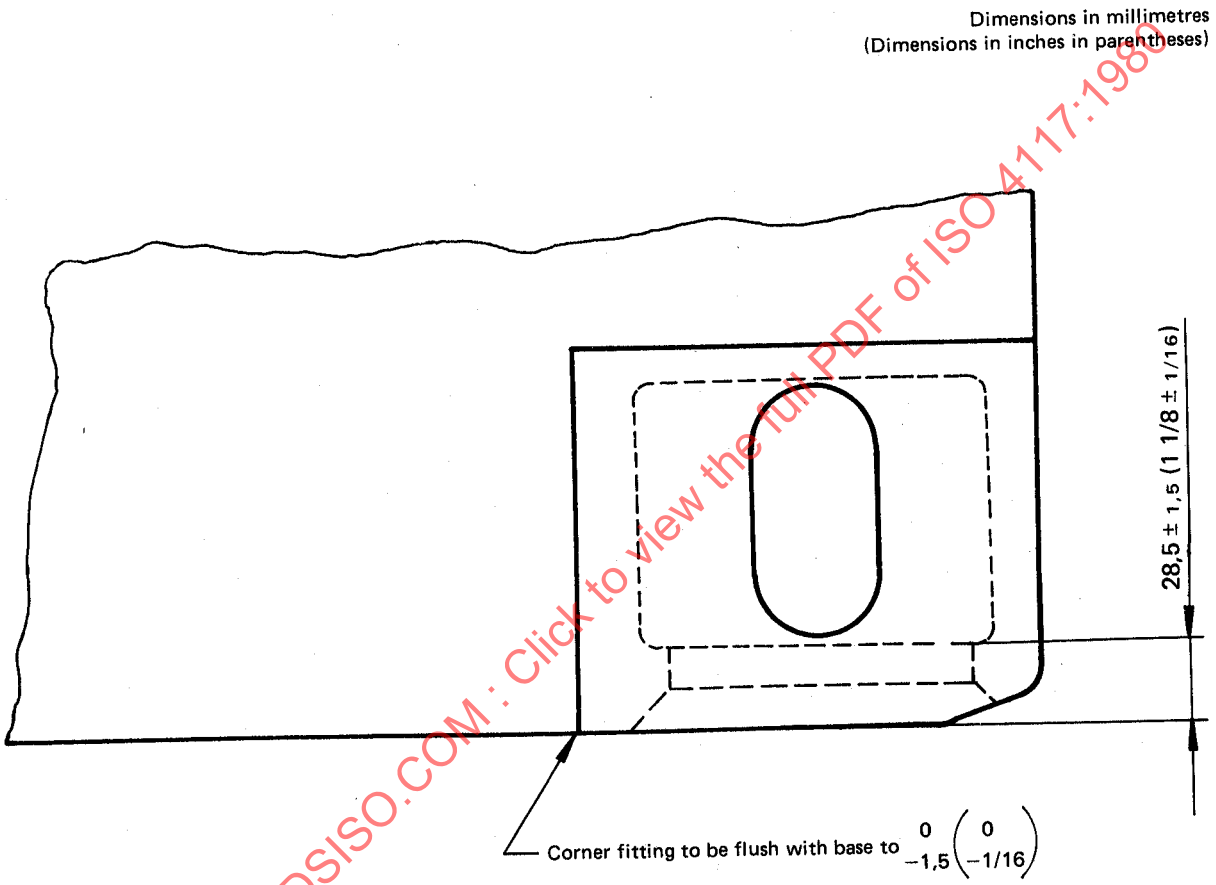
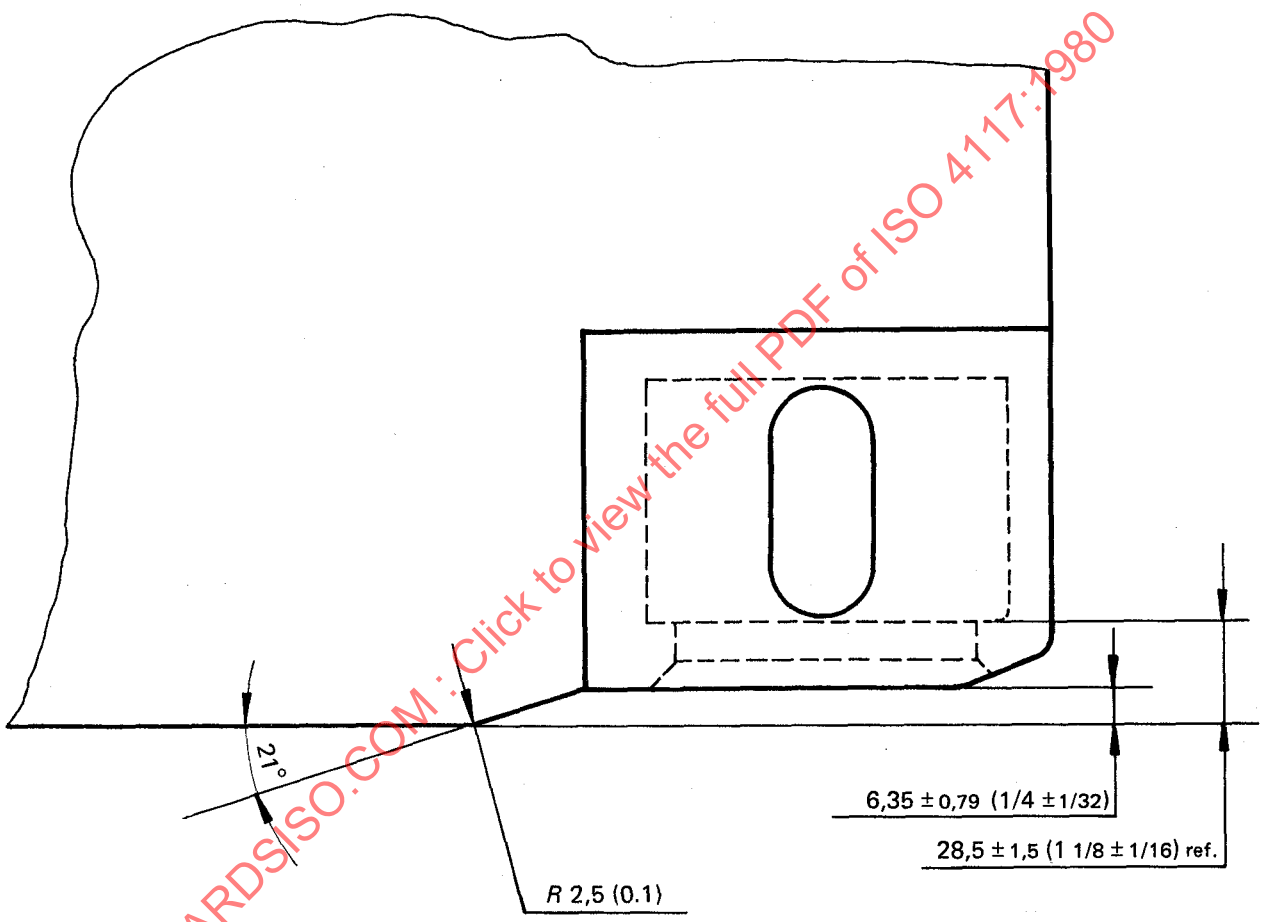


Figure 7 — Location of bottom corner fitting, Type B pallet

Dimensions in millimetres
(Dimensions in inches in parentheses)

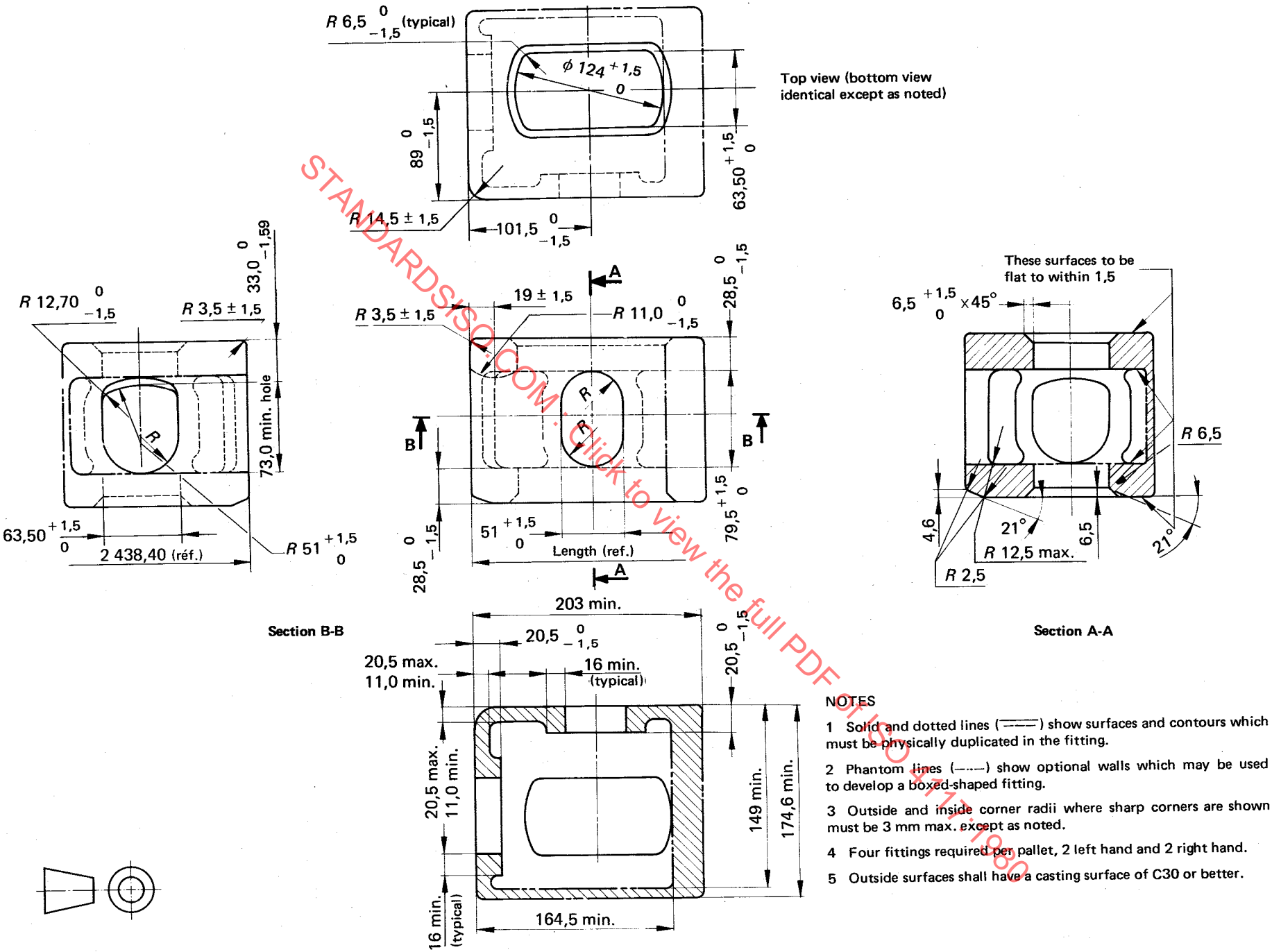


NOTES

1 This typical configuration is constant all around the juncture of the corner fitting with the base rail.

2 Blend all lower edges with a minimum radius of 2,5 (0.1).

Figure 8 — Recessed corner fitting option, Type B pallet



NOTES

1 Solid and dotted lines (———) show surfaces and contours which must be physically duplicated in the fitting.

2 Phantom lines (— · — · —) show optional walls which may be used to develop a boxed-shaped fitting.

3 Outside and inside corner radii where sharp corners are shown must be 3 mm max. except as noted.

4 Four fittings required per pallet, 2 left hand and 2 right hand.

5 Outside surfaces shall have a casting surface of C30 or better.

Figure 9 — Flush mounted corner fitting — Dimensions in millimetres (see figure 7)

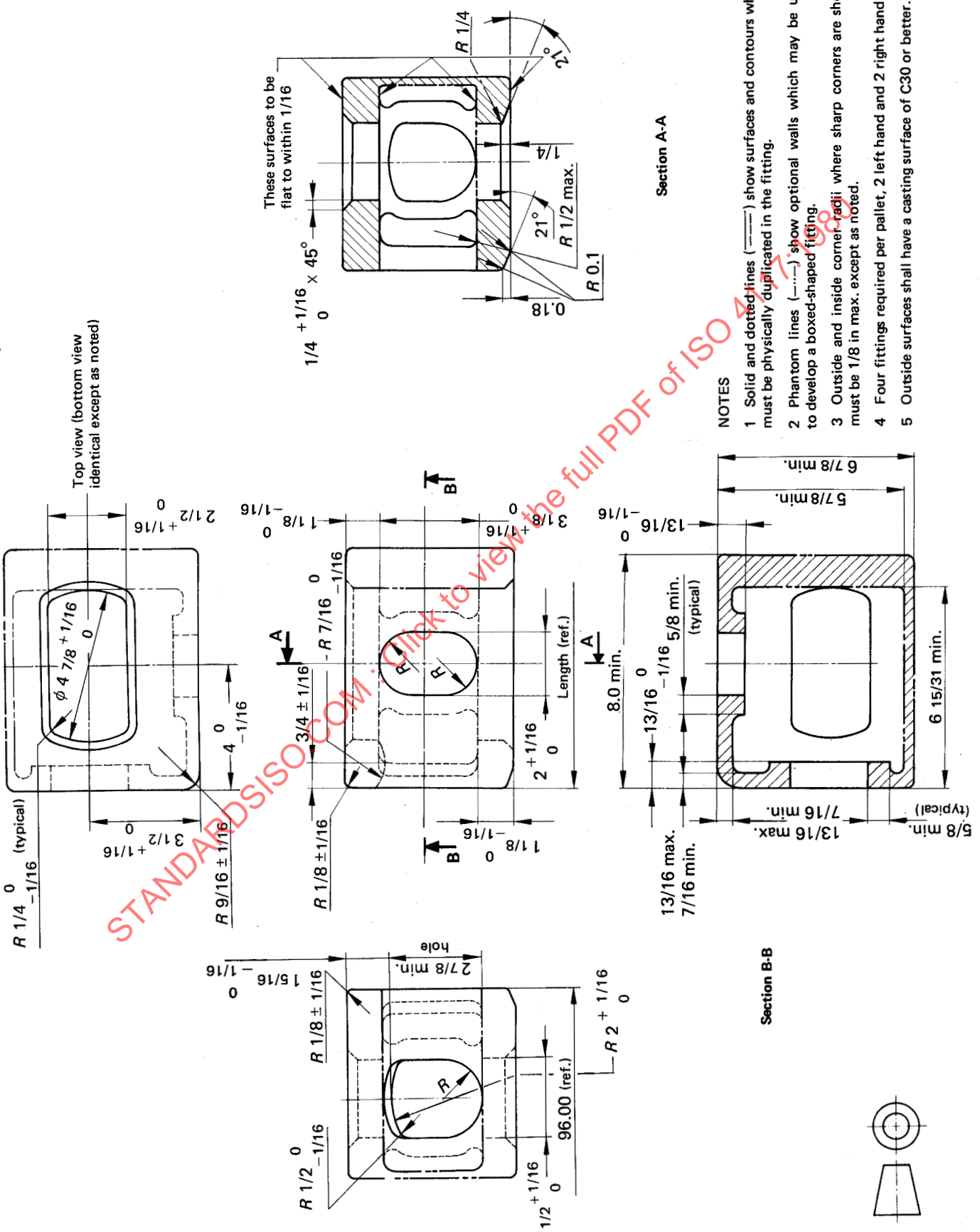


Figure 9A — Flush mounted corner fitting — Dimensions in inches (see figure 7)

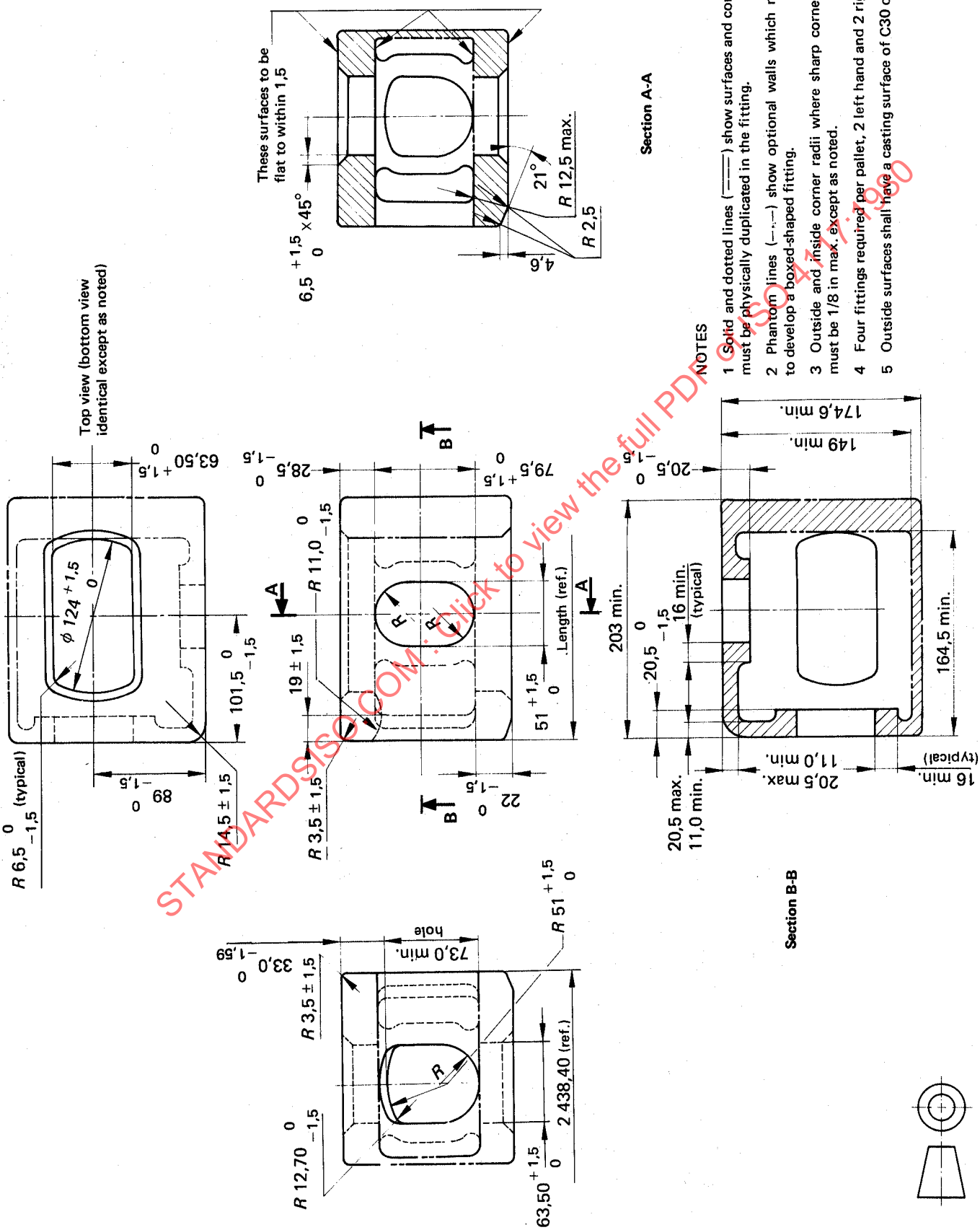


Figure 10 — Recessed corner fitting — Dimensions in millimetres (see figure 8)

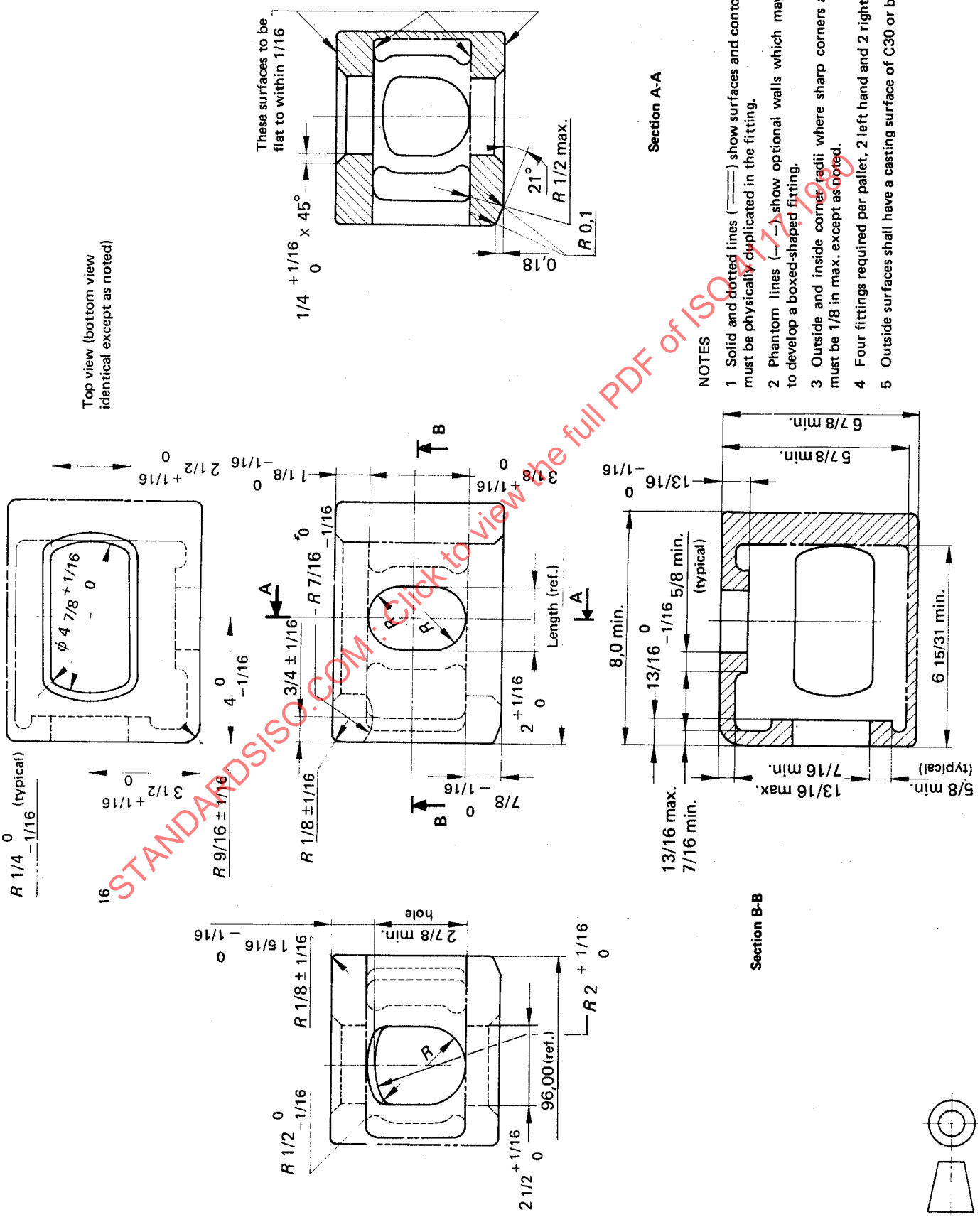


Figure 10A — Recessed corner fitting — Dimensions in inches (see figure 8)