The Engineering Society
For Advancing Mobility
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I N T E R N A T I O N A L

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE STANDARD

AS1130

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REV. E

Submitted for recognition as an American National Standard

AIR AND AIR/SURFACE (PLATFORM) CARGO PALLETS

1. PURPOSE:

This Aerospace Standard (AS) provides 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 equipped with NAS 3610 Class II (1.5G) restraint systems and is intended to be compatible with the 2.44 x 2.44 m (8 x 8 ft) cross-section containers described in AS832. The Type C adapter pallet is intended to be compatible with 2.44 x 2.44 m (8 x 8 ft) cross section containers described in ANSI MH 5.1, Cargo Containers & ISO 1496 Series 1, Freight Containers. Pallet nets used in conjunction with these pallets are described in AS1131. The minimum essential criteria are identified by use of the key word “shall”. Recommended criteria are identified by use of the key word “should”, and while not mandatory, are considered to be of primary importance in providing serviceable, economical and practical air transport pallets. Deviation from recommended criteria should occur only after careful consideration, extensive testing and thorough service evaluation have shown alternate methods to be satisfactory.

1.1 Reference Documents:

1.1.1 AS1131, Air-Land Cargo Pallet Nets

1.1.2 NAS 3610, Cargo Unit Load Devices, Specification for.

Aerospace Industries Association of America, Inc.
1725 DeSales Street N.W.
Washington, D.C. 20036

1.1.3 MS33601A, Track & Stud Fitting for Cargo Transport Aircraft, Standard Dimensions for

1.1.4 IATA 50/9, 20 Ft Pallet for NAS 3610 Class II Restraint System. International Air Transport Assoc., 2000 Peel Street, Montreal, Quebec, Canada H3A 2R4

1.1.5 United States Federal Test Method Standard 406, Plastics - Methods of Testing. Available from Specification Sales, Bldg. 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407.

1.1.6 AS832, Air & Air/Surface (Intermodal) General Purpose Containers.

1.1.7 American National Standard (ANSI) MH5.1, Basic Requirements for Cargo Containers.

1.1.8 ISO 1496/1, Series 1 Freight Containers - Specification & Testing - Part 1: General Cargo Containers

1.1.9 Federal Aviation Regulation (FAR) Part 25, United States Department of Transportation.

2. SCOPE:

2.1 This AS establishes three classes of pallets: Type A, Air only; B, Platform (Air/Surface Intermodal); and C, Adapter.

2.2 Pallets will have nominal dimensions of 2.44 m wide and lengths of 3.05, 6.10, 9.14 and 12.2 m (8 x 10 ft, 8 x 20 ft, 8 x 30 ft, and 8 x 40 ft) and are covered by NAS 3610 codes 2FIP, 2GIP, 2HIP and 2JIP.

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

2.4 Platform Pallets (Type B) are suitable for Air/Surface handling and transport systems. Supplementary requirements for Type B version are found in Section 4.

2.5 Air Adapter Pallets (Type C) are for use to adapt 8 x 8 ft surface mode only containers for air transport. Supplementary requirements for Type C version are found in Section 5.

NOTE: Use of the adapter pallet with surface mode only 8 x 8 ft containers may require uniform load distribution on the base cross members of these containers for carriage on certain aircraft. The Aircraft Approved Weight and Balance Manual should be referred to for loadability procedures or limitations, or both.

3. BASIC REQUIREMENTS:

3.1 External dimensions and pallets shall be as specified in Table I and Fig. 1. Diagonal tolerance shall be as specified in Table II.

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.

3.2.2.1 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 have sufficient structural strength to withstand without permanent deformation the static and dynamic loads and the impact shock encountered in normal carrier service.

3.3 Pallet Surfaces:

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

3.3.1.1 For the length of the pallet the bottom surface shall have a smooth to a flat plane within 1.6 mm (0.0625 in). This shall allow for a waviness factor of crest to crest at a pitch of 914 mm (36 in) minimum.

3.3.2 No structure shall protrude below the lower surface.

3.3.3 Construction:

3.3.3.1 The pallet edges (Length “L”) shall have a nominal thickness of 50.8 mm (2 in) from the lower surface. This thickness may be varied when the design employed results in a lighter and more durable structure capable of accepting uniform loading of 1953 kg/m^2 (400 lb/ft^2) when supported on conveying system per 3.3.3.3.

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

- The pallet bottom skin shall be enclosed by its edge extrusion.
- The bottom surface shall be flush with the edge member.
- The lower edge of the edge members shall be as shown in Fig. 4.
- The pallet corners shall have a 63.5 ± 12.7 mm (2.50 ± 0.50 in) radius in the plane of the pallet.
- Pallet corners should be readily replaceable when built as a separate bolted or riveted on part.

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 1930.4 mm (76 in) measured between centers with each row composed of 38 mm (1.5 in) diameter rollers 76.2 mm (3 in) long uncrowned with edge radius of 1.6 mm (0.06 in) R, spaced on 254 mm (10 in) centers. Pallet travels perpendicular to roller axis.

- Swivel casters with 25 mm (1 in) diameter wheels having a contact length of 51 mm (2 in) located on a 305 x 305 mm (12 x 12 in) grid pattern. Pallet travel is in all directions across grid.

- Ball transfer units with 25 mm (1 in) diameter balls located on a 127 x 127 mm (5 x 5 in) grid pattern. Pallet travel is in all directions across grid.

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

- Ball identation per 6.2.

- Ball casters per 6.3.

- Abrasion per 6.4.

3.3.4 Net attachments shall be per MS33601A as shown in Figs. 1 and 5. As an option, a continuous seat track per MS33601A may be incorporated in the pallet upper surface for net or strap attachments.

3.4 Aircraft Restraint Provision: Restraint provision as shown in Figs. 2, 3 and 4 shall be provided.

3.5 Complete Assembly:

3.5.1 Pallet shall be capable of traversing a 0.035 rad (2 deg) crest or valley with no permanent deformation or damage.

3.5.1.1 To meet this condition pallets uniformly loaded to gross weight shall be capable of being supported at the cresting point through a roller contact of 2032 mm (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 2721.5 kg (6000 lb) on each of two wheels on 762 mm (30 in) centers anywhere on the pallet while resting on a surface of sufficient strength and continuity to adequately support the pallet.

3.5.4 The minimum pallet core stiffness shall be 225 kNm^2 per m (2 x 10^6 $lb\text{-}in^2$) width of the core.
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3.6 Ratings:

3.6.1 The pallet shall be designed for the following gross weights:

3.6.1.1 10 ft pallet 5679 kg (12 500 lb)

3.6.1.2 20 ft pallet 11 338 kg (25 000 lb)

3.6.1.3 30 ft pallet 15 873 kg (35 000 lb)

3.6.1.4 40 ft pallet 20 408 kg (45 000 lb)

3.6.2 Pallets over 3.05 m (10 ft) length shall be designed for a gross weight of 6759 kg (14 900 lb) in any 3.05 m (10 ft) section of the pallet.

3.7 Design Loads:

3.7.1 Table of Loads: The pallet assembly will be used in conjunction with a net per AS1131 to restrain the loads listed below:

NAS 3610 Code Sizes	Dimensions	Maximum Gross Loads
2 FIP	2438 x 2991 mm (96 x 117.75)	5669 kg (12 500 lb)
2 GIP	2438 x 6058 mm (96 x 238.50)	11 338 kg (25 000 lb)
2 HIP	2438 x 9125 mm (96 x 359.25)	15 873 kg (35 000 lb)
2 JIP	2438 x 12 192 mm (96 x 480)	20 408 kg (45 000 lb)

3.7.2 Ultimate Loads: The pallet assembly shall be designed to the ultimate load per NAS 3610 while supported on a roller system in accordance with 3.3.3.3 with the cargo center of gravity located at any point in the range specified in 3.7.6. Under these loads the pallet may exhibit permanent deformation, but shall not rupture to the extent of discharging cargo.

3.7.3 Fore and aft loads shall be reacted by a latch per Fig. 11 inserted in the restraint slots as shown in Figs. 3 and 4. The minimum latches required, either on one or both sides of the pallet, are as follows:

3.7.3.1 10 ft pallet - 2 latches

3.7.3.1.1 20 ft pallet - 5 latches

3.7.3.1.2 30 ft pallet - 8 latches

3.7.3.1.3 40 ft pallet - 11 latches

3.7.3.2 The ultimate fore and aft load for any slot shall be 8340 daN (18 750 lb).

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

3.7.4 Up load shall be reacted by a latch per Fig. 12 inserted in the side restraint slots as shown in Figs. 3 and 4.

The minimum vertical restraint latches required, equally distributed on both sides and equally spaced along the full length of the pallet, are as follows. This includes the fore and aft restraint latches.

3.7.4.1 10 ft pallet - 6 latches

3.7.4.2 20 ft pallet - 12 latches

3.7.4.3 30 ft pallet - 18 latches

3.7.4.4 40 ft pallet - 24 latches

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

3.7.5.1 Slots shall be designed to restrain a 3.05 m (10 ft) pallet for ultimate forward, aft and vertical up loads when used in conjunction with restraint fittings in accordance with Fig. 10.

3.7.5.2 Slots to be used for Ground Transport Restraint on Roller Bed Vehicles shall be provided as shown in Fig. 2. The inner face of each outward slot (or block) shall be capable of restraining laterally 33% of the maximum unit gross weight. The pallet lower edge member shall be capable of restraining an upward load of 20% of the maximum unit gross weight in the slot area.

3.7.6 Center of gravity shall be assumed to vary:

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

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

3.7.6.3 1219.2 mm (48 in) vertically measured from pallet bottom surface.

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

3.7.7 Each of the four base corners of the pallet shall be capable of reacting a 8340 daN (18 750 lb) in either the longitudinal or lateral direction.

3.7.8 The cargo net attachment fittings shall include the provision for attaching a cargo tie down fitting, each capable of reacting a 2224 daN (5000 lb) ultimate load in any direction.

4. SUPPLEMENTAL REQUIREMENTS FOR AIR/LAND PALLETS:

4.1 B Pallet Types:

4.1.1 Type IB shall incorporate fittings at the four corners conforming to Fig. 7.

4.1.2 Type IIB are 10 and 20 ft pallets only and shall incorporate forklift tineways located per Fig. 9 and fittings at the four corners conforming to Fig. 7.

4.2 Ground Operational Loads:

4.2.1 The Type B pallets shall be capable of withstanding without permanent deformation a uniformly distributed down load equal to twice the maximum unit gross weight while supported by slings or frame connected to the four corner fittings.

4.2.2 Type IIB pallets shall be capable of withstanding a down load equal to 1.25 the maximum unit gross weight while supported by a forklift truck.

4.2.3 Each of the four corners shall be capable of reacting at least an 8340 daN (18 750 lb) load in either the longitudinal or latitudinal direction.

4.3 The pallet edges (length "L") shall have a minimum thickness of 139.7 mm (5.5 in) from the lower surface.

5. SUPPLEMENTAL REQUIREMENTS FOR AIR ADAPTER PALLETS:

5.1 C Pallet Type:

5.1.1 The pallet shall incorporate alignment pegs at the four corners conforming to Fig. 14. Each of the alignment pegs shall be capable of reacting at least an 8340 daN (18 750 lb) load in the longitudinal, lateral and vertical (down only) direction.

5.1.2 The pallet shall incorporate side slots and strap receptacles conforming to Fig. 13. See Fig. 15 for typical usage of restraint straps to secure a surface mode container to adapter pallet.

5.1.2.1 The strap receptacle fitting shall include the provision for attaching a tie-down fitting, each capable of reacting a 2224 daN (5000 lb) ultimate load in the longitudinal and vertical direction.

5.1.3 The pallet edges shall have a nominal thickness of 57 mm (2.25 in) from the lower surface.

5.1.4 The pallet shall be enclosed on all four sides by an edge member conforming to Figs. 2, 3, 4 and 13.

5.1.5 The pallet corners shall have a 14.5 mm (0.56 in) radius.

5.1.6 Aircraft restraint provisions as shown in Figs. 2, 3, 4, and 13 shall be provided.

5.1.7 Up, fore and aft loads shall be reacted by a fitting inserted in the restraint slots shown in Figs. 3, 4, and 13.

6. ENVIRONMENTAL CRITERIA:

6.1 Materials:

6.1.1 The pallet should be designed and built using materials which will provide maximum serviceability and protection of contents under intended environmental conditions, and shall meet the appropriate provision of Federal Aviation Regulations per FAR Part 25.

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

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

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

6.2 Ball Load Capability: The pallet base surface or a representative portion thereof shall be subjected to 408 kg (900 lb) on a 25 mm (1 in) diameter steel ball without permanent indentation in excess of 0.51 mm (0.020 in).

6.3 Ball Caster Load Capability: The base or a representative portion thereof shall be subjected to a uniformly distributed load of 95.5 kg (210 lb), supported by four 25 mm (1 in) diameter steel ball casters on a 127 mm (5 in) grid pattern. The base shall be moved over the casters for a minimum of 5000 passes along a fixed line in each of two directions, 1.57 rad (90 deg) 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 caster interface surface.

6.4 Abrasion Resistance for Plastic Coated or Magnesium-Base Materials: Three samples of the pallet base assembly material will be subjected to a test method equivalent to United States Federal Test Method Standard No. 406, Method 1091, except the abrasion wheel shall be dressed every 1000 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 1000 Revolutions - 0.015 g
After 2000 Revolutions - An additional 0.005 g
After 5000 Revolutions - An additional 0.030 g
Up to a TOTAL of 0.050 g

6.5 Weight Limits: The tare weight of the pallet assembly shall be a minimum consistent with the requirements and within limits of sound design practices.

6.6 Materials and Processes:

6.6.1 The materials and processes selected should give consideration to the extremely 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.

6.6.2 Materials shall be flame resistant in accordance with the regulatory requirements.

6.6.3 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.

7. TESTING REQUIREMENTS:

7.1 Scope:

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

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

7.1.3 Test equipment and methods of testing described are not meant to be restrictive. Alternate equivalent methods to accomplish the desired result may be employed.

7.1.4 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 until all component parts are inspected and those that exhibit permanent deformation are replaced.

7.2 Test Criteria:

7.2.1 A pallet shall be considered satisfactory if, upon inspection before and after testing, its dimensions fall within those specified in Tables I and II and in applicable manufacturing drawings.

7.2.2 Permanent deformation is permitted under ultimate load conditions. A pallet shall be considered within acceptable limits if it exhibits permanent deformation but does not rupture to the extent of discharging cargo or break free from the restraint system.

7.3 Recommended Test Equipment:

7.3.1 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 guide the pallet along the conveyor and secure it at its latch points. The test system shall be of sufficient length to permit cycling of the longest pallet to be tested.

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

7.3.3 An industrial truck or equivalent equipment capable of a maximum load of 5443 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 centers shall be provided.

7.3.4 A net per AS1131 shall be provided.

7.3.5 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 the pallet vertically on either side or end. Bridle chains, cables or spreaders with capacity to lift the loaded pallet at the four corners with appropriate capacity hooks or shackles shall be provided.

7.4 Test Procedure - Operational Loads:

7.4.1 Test 1 - Lifting:

7.4.1.1 Type B pallets shall be loaded to twice gross weight and lifted vertically from the four corner fittings. After lifting, the pallet shall be suspended for not less than five minutes and then lowered to the ground. Permanent deformation shall not occur.

7.4.1.2 Type IIB pallets shall be uniformly loaded to 1.25 gross weight and lifted clear of the ground. The pallet shall be supported on two horizontal bars, each 200 mm (8 in) wide projecting 1828 ± 3 mm (72 ± 1/8 in) into the fork lift pocket. The bars shall be centered within the pockets. After lifting, the pallet shall be suspended for not less than five minutes and then lowered to the ground. Permanent deformation shall not occur.

7.4.2 Test 2 - Pallet Strength:

7.4.2.1 Pallets shall have the base resting on a surface of sufficient strength and continuity to adequately support the pallet. An industrial forklift loaded to an axle weight of not less than 5443 kg (12 000 lb) (including the weight of the truck) or 2722 kg (6000 lb) per wheel, applied to a contact area not greater than 142 cm^2 (22 in^2) assuming a wheel width of not less than 178 mm (7 in) and wheel centers of 762 mm (30 in) shall then be maneuvered over the pallet. The path of the test vehicle shall be patterned over the entire top surface area of the pallet. One cycle is defined as the test vehicle driving onto the pallet, traveling its entire length and driving off the pallet from the drive on end. This maneuver shall be repeated for 100 cycles.

7.4.2.1.1 No permanent deformation or failure shall occur.

7.4.2.2 While retained on the aircraft loading system or its equivalent, the pallet shall be uniformly loaded to 5864 kg/m^2 (1200 lb/ft^2). The load shall be applied to an area 1.52 m (5 ft) wide centered in the pallet and the load shall equal but not exceed three times maximum payload.

7.4.2.2.1 No permanent deformation or failure shall occur.

7.4.2.3 The pallet under test shall be latched to the aircraft system or its equivalent. The number of latches shown in 3.7.3 shall be engaged on one side and adjusted by suitable means to assure contact with the end of the latch, receptacle slot. With a net per AS1131 attached to the pallet, a uniformly distributed load equal to the gross weight shall be applied to one 2438 mm (96 in) end of the net. The center of gravity of the load shall be 1219 mm (48 in) vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 3.7.6.

7.4.2.3.1 No permanent deformation or failure shall occur.

7.4.2.3.2 Repeat 7.4.2.3 for 3.05 m (10 ft) pallet using only restraints in fore and aft slots in accordance with Fig. 10.

7.4.2.4 With the pallet on the aircraft system or its equivalent, the number of latches shown in 3.7.4 per Fig. 12 equally distributed on both sides shall be engaged and adjusted by suitable means to assure vertical restraint. With a net per AS1131 attached to the pallet, a uniformly distributed load equal to the gross weight shall be applied to one side of the nrt. The center of gravity of the load shall be 1219 mm (48 in) vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 3.7.6.

7.4.2.4.1 No permanent deformation or failure shall occur.

7.4.2.5 The pallet shall be suspended upside down from the aircraft loading system or its equivalent. The number of latches shown in 3.7.4 per Fig. 12 distributed on both sides shall be engaged and adjusted by suitable means to assure contact when the load is applied. The pallet shall have a load equal to the gross weight uniformly distributed tied down with a net per AS1131 .

7.4.2.5.1 No permanent deformation or damage shall occur.

7.4.2.6 Test per 7.4.2.5 shall be repeated for 10 ft pallets using only restraint in accordance with Fig. 10.

7.4.2.7 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 (60 ft) per minute.

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

7.4.2.7.2 The rollers used in the test section shall conform to 3.3.3.3. Shell of the roller shall be a high quality aluminum alloy. Bearing used in rollers shall be selected to ensure test set-up coefficient of friction does not exceed 0.02 at 1.0 g loading.

7.4.2.7.3 Maximum displacement of roller top from a theoretical plane should be varied randomly to a maximum of ±0.76 mm (±0.03 in).

7.4.2.7.4 Each cycle shall be equal to twice container length.

7.4.2.7.5 At test speed or at breakaway, draw-bar pull shall be recorded periodically. Maximum allowable draw-bar pull shall not exceed 3% of the pallet gross weight at test speed or 5% of the pallet gross weight at breakaway. Maximum variation of draw-bar pull from the first to the last cycle shall not exceed 0.5% of gross weight.

7.4.2.8 The pallet under test shall be secured to a rigid base using only latches in accordance with Fig. 10 engaged in the fore and aft ground transport slots shown in Fig. 2. The latches shall be adjusted by suitable means to insure restraint and contact with the inner face of each outward slot.

7.4.2.8 (Continued):

The pallet shall have a test load equal to 0.33 gross weight applied horizontally in an inward direction to each inner face on one of the outward slots. Simultaneously, a test load equal to 0.20 gross weight shall be applied vertically in an upward direction to the pallet edge member in the opposite slot area. The test loads shall be applied to both ends of the pallet. The test shall be repeated in the opposite slots unless the slots and edge members are identical.

7.4.2.8.1 No permanent deformation or damage shall occur.

7.4.2.9 Attachment Receptacle Test:

7.4.2.9.1 Cargo Tie Down: A two-stud bulk cargo tiedown fitting shall be used to fit the receptacle or optional track shown in Fig. 5. 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 assure vertical restraint. The pallet receptacle or optional track shall be tested by applying a 2224 daN (5000 lb) tension load in all directions, horizontal to vertical. The load applications point shall be 21 mm (0.83 in) or less from the head of the stud.

7.4.2.9.2 Net Attachment: A one-stud net attachment fitting as shown in Fig. 5 shall be engaged in the net attachment receptacle or optional track shown in Fig. 5. The pallet receptacle or optional track shall be tested by applying a 890 daN (2000 lb) tension load in all directions, horizontal to vertical. The load application point shall be 21 mm (0.83 in) or less from the head of the stud.

7.4.2.9.3 Strap Attachment, Type C Pallet: A two-stud bulk cargo tie-down fitting shall be used to fit the receptacle or optional track shown in Figs. 5 and 13 and the test per 7.4.2.9.1 repeated.

7.4.2.10 For Type B pallets while supported at the four corners.

7.4.2.10.1 Repeat Test 7.4.2.1.

7.4.2.10.2 No permanent deformation or damage shall occur.

7.4.3 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 incur failure of pallet during the design life of the pallet.

7.4.4 The pallet shall be placed empty in a suitable test chamber at 71°C (160°F) ambient temperature for 48 hours.

7.4.4.1 At the end of 48 h, its condition shall be evaluated while the structure is at or near the test temperature.

7.4.4.2 The pallet shall then be placed empty in a suitable test chamber in a -54°C (-65°F) ambient temperature for 48 hours.

7.4.4.3 At the end of 48 h, its condition shall be evaluated while the structure is at or near the test temperature.

7.5 Production Pallets: To show compliance with its specification standard, commercial inspection and quality control methods and practices shall be used to assure 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.

8. MARKING REQUIREMENTS:

8.1 All pallets covered by this specification shall be marked in accordance with the requirements of NAS 3610 Clause 3.5.

8.2 The following additional markings should also be included. The markings shall be permanently engraved onto 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 305 mm (12 in) from the corner. The letter size shall be large enough to ensure good readability.

I.D. Code _____ Min. Letter Height 0.25 in (6 mm)
Manufacturer _____ Mfg. P/N _____
(Name & Country)

NOTE: The I.D. Code is an international unit marking system consisting of:

1) 3 digits (alpha) for the type and size code.

2) 4 digits (numeric) for individual serial number.

3) 2 digits (alpha) for owner code (airline or non-airline)

I.D. codes are assigned by the U.L.D. Registrar, International Air Transport Association, 2000 Peel Street, Montreal, Quebec, Canada H3A 2R4.

PREPARED BY
SAE SUBCOMMITTEE AGE-2A,
CARGO HANDLING OF
SAE COMMITTEE
AGE-2, AIR CARGO & AIRCRAFT GROUND EQUIPMENT & SYSTEMS

TABLE I

PALLET DIMENSIONS [1]

OVERALL LENGTH in		OVERALL LENGTH mm		OVERALL WIDTH in		OVERALL WIDTH mm		NOMINAL THICKNESS	DIM. A in	DIM. A mm	DIM. B in	DIM. B mm	DIM. C in	DIM. C mm	DIM. D in	DIM. D mm
+0		+0		+0		+0										
480		12 192		96		2438		[2]	9.42	239.27	15.43	391.92	9.37	238.00	16.50	419.10
-3/8		-9.5		-3/16		-4.8										
+0		+0		+0		+0										
359-1/4		9 125		96		2438		[2]	9.42	239.27	15.43	391.92	9.37	238.00	16.90	429.26
-3/8		-9.5		-3/16		-4.8										
+0		+0		+0		+0										
238-1/2		6 058		96		2438		[2]	9.42	239.27	15.43	391.92	9.37	238.00	17.02	432.31
-1/4		-6.4		-3/16		-4.8										
+0		+0		+0		+0										
117-3/4		2 991		96		2438		[2]	9.42	239.27	15.43	391.92	9.37	238.00	16.47	418.34
-3/16		-4.8		-3/16		-4.8										

[1] See Fig. 1 for dimension locations.

[2] For Type A 2.0 in (50.8 mm)
For Type B 5.5 in (139.7 mm)
For Type C 2.25 in (57.2 mm)

TABLE II

DIAGONAL TOLERANCES - TYPE B & C PALLETS

OVERALL LENGTH in	OVERALL LENGTH mm	S in	S mm	P in	P mm	K_1 MAX in	K_1 MAX mm
480	12 192	472	11 988.8	89	2260.6	3/4	19
359-1/4	9 125	351-1/4	8 921.7	89	2260.6	5/8	15.9
238-1/2	6 058	230-1/4	5 848.4	89	2260.6	1/2	12.7
117-3/4	2 991	109-3/4	2 787.6	89	2260.6	3/8	9.5

For definitions of S, P and D, see Fig. 8

$K_1 = D_1 - D_2$

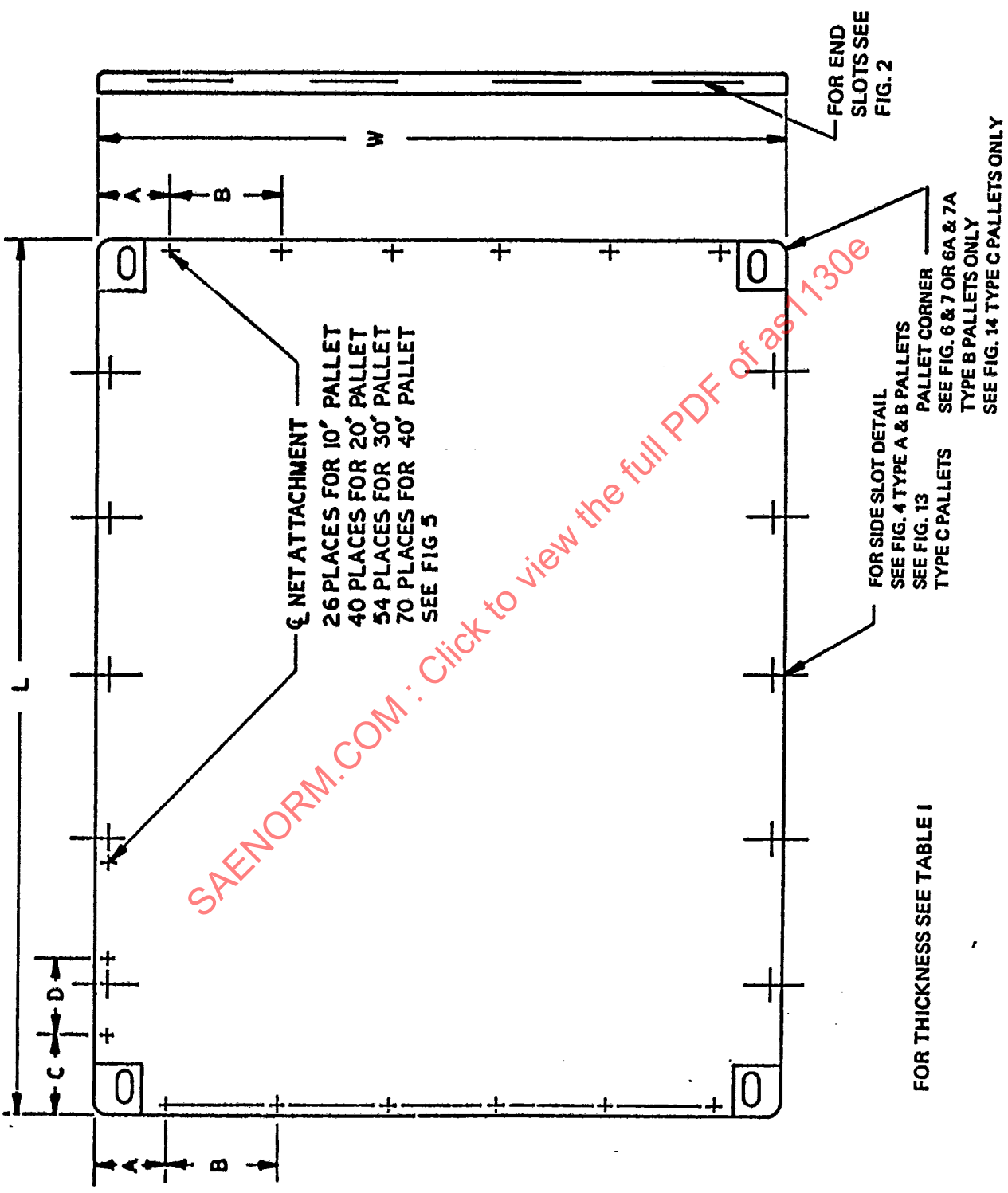


FIGURE 1

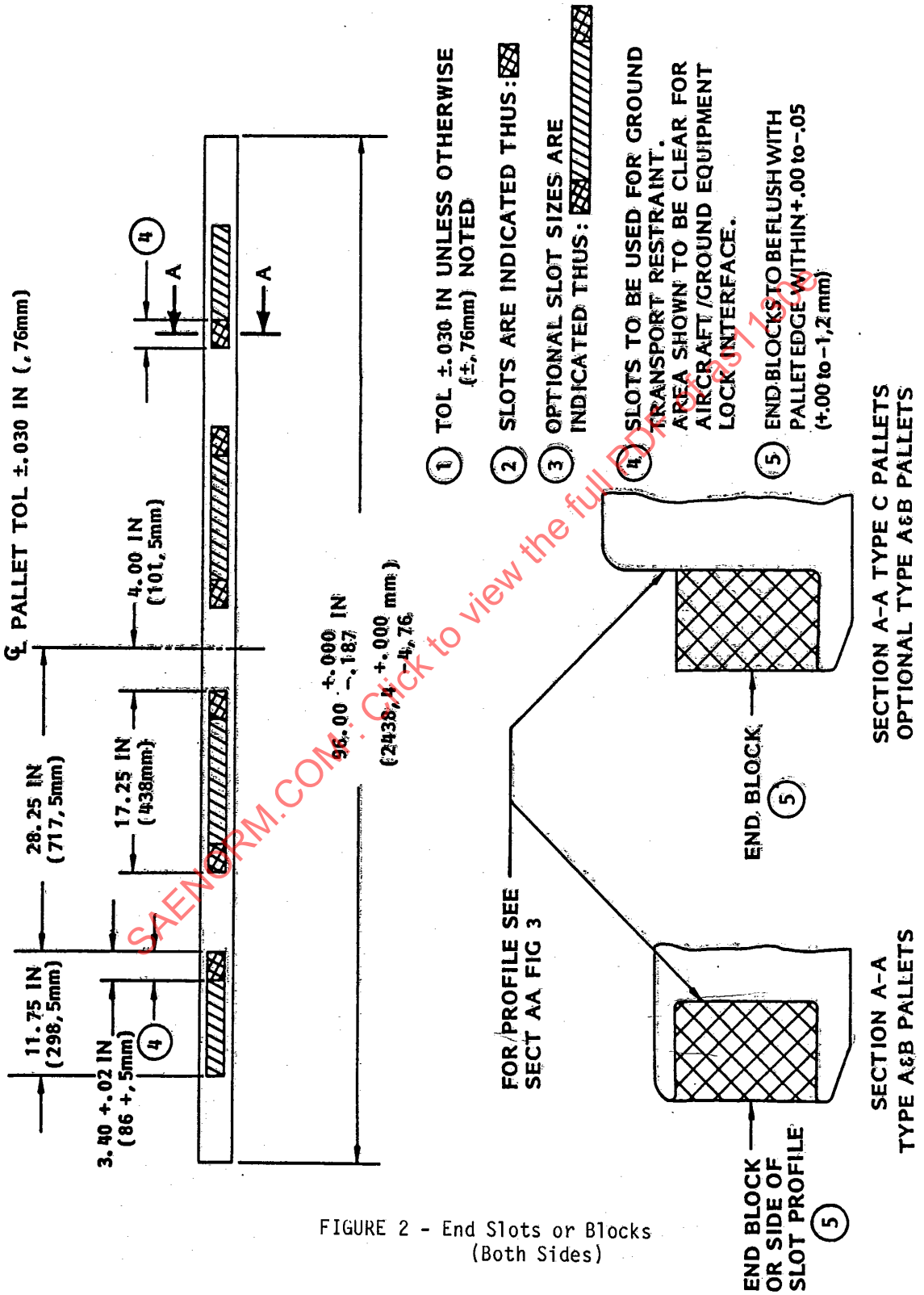


FIGURE 2 - End Slots or Blocks (Both Sides)

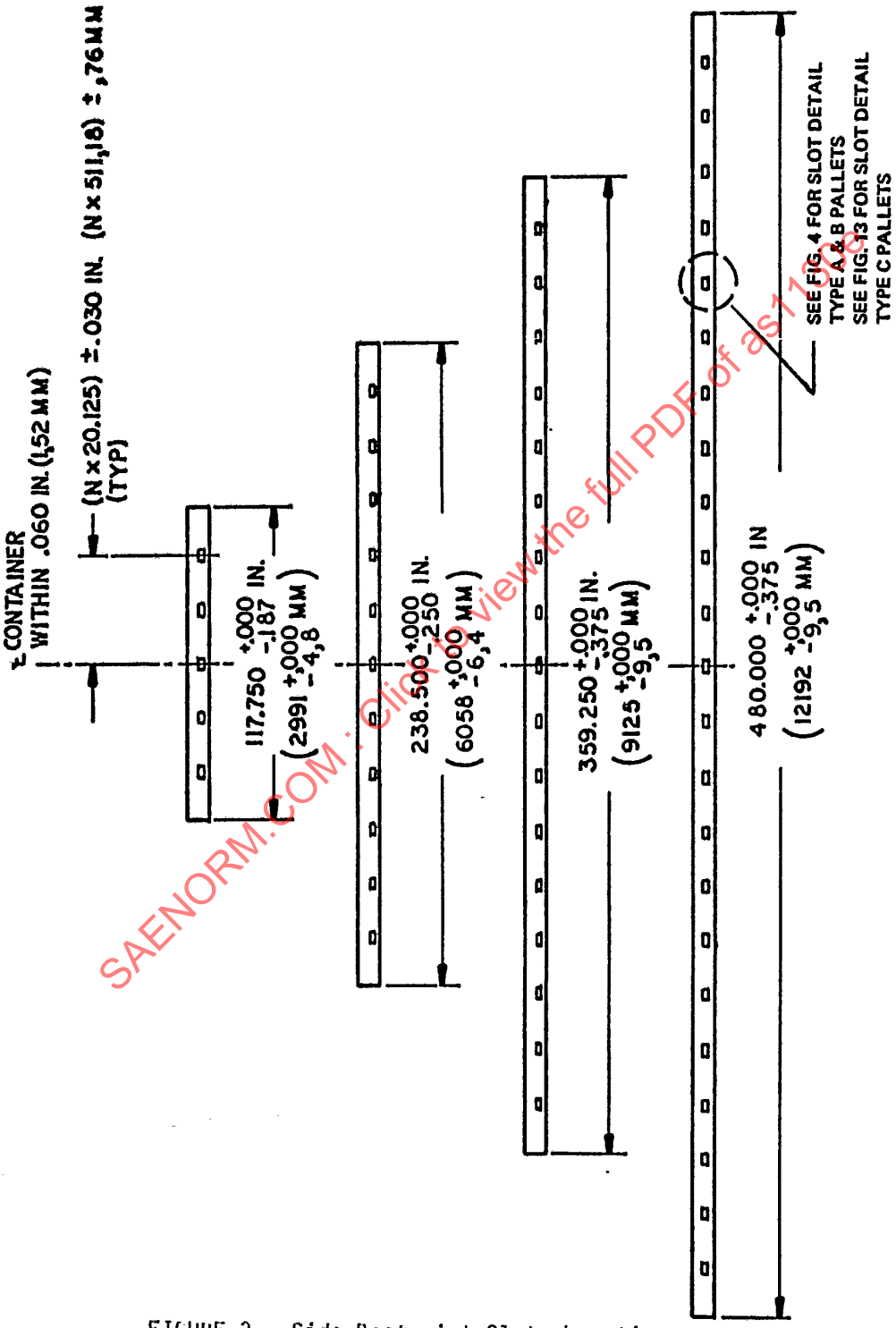
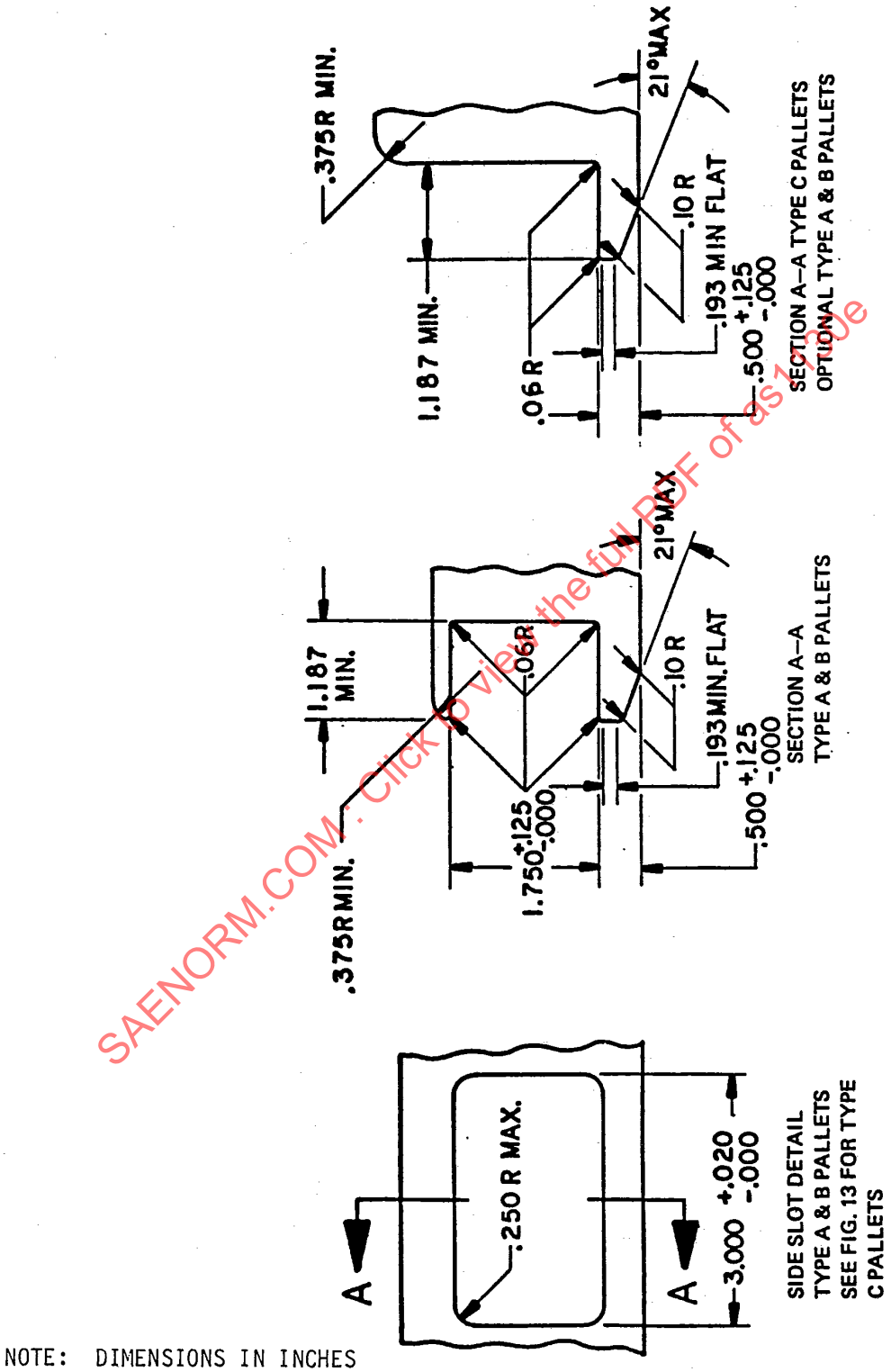
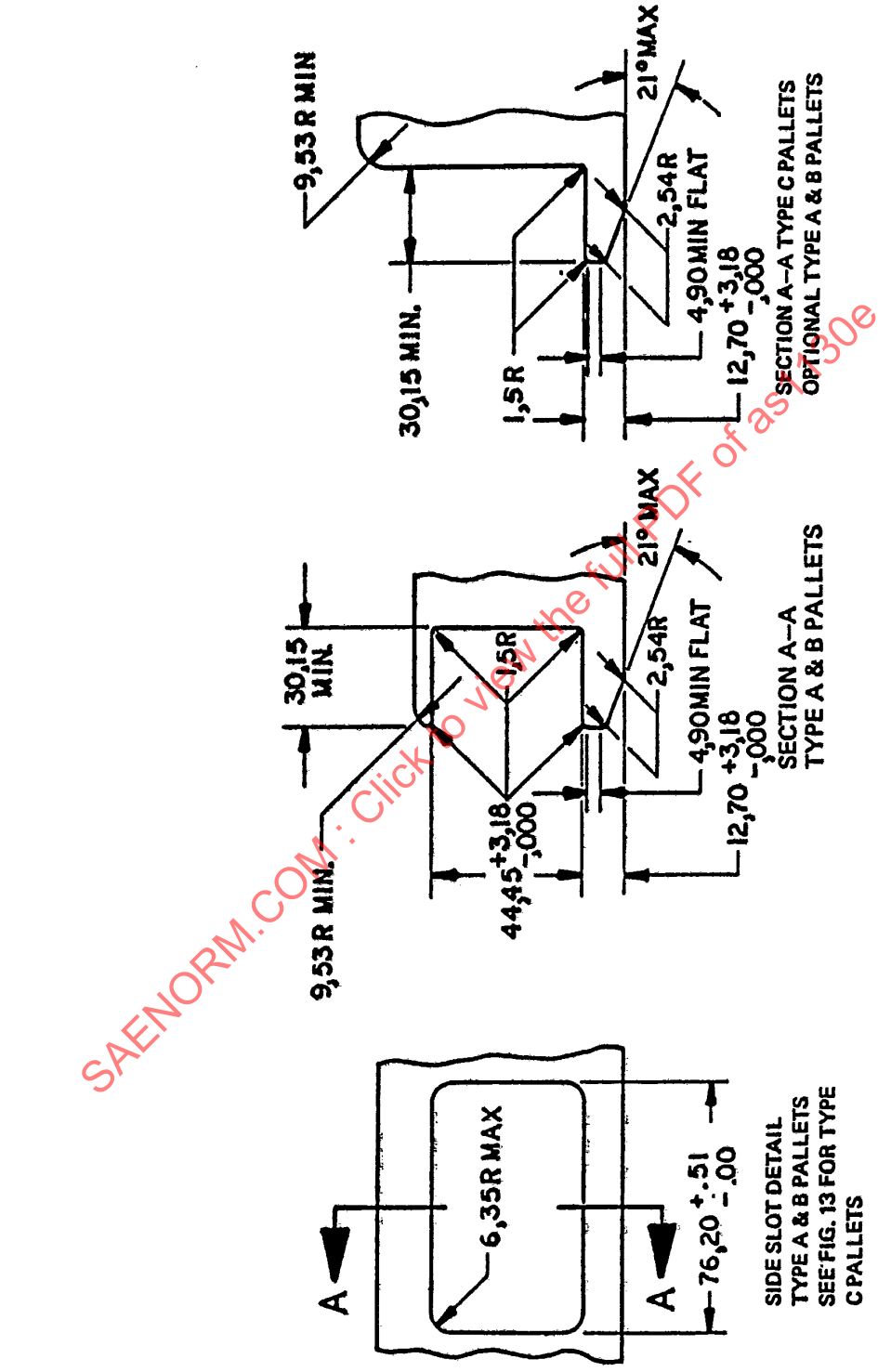


FIGURE 3 - Side Restraint Slots Location



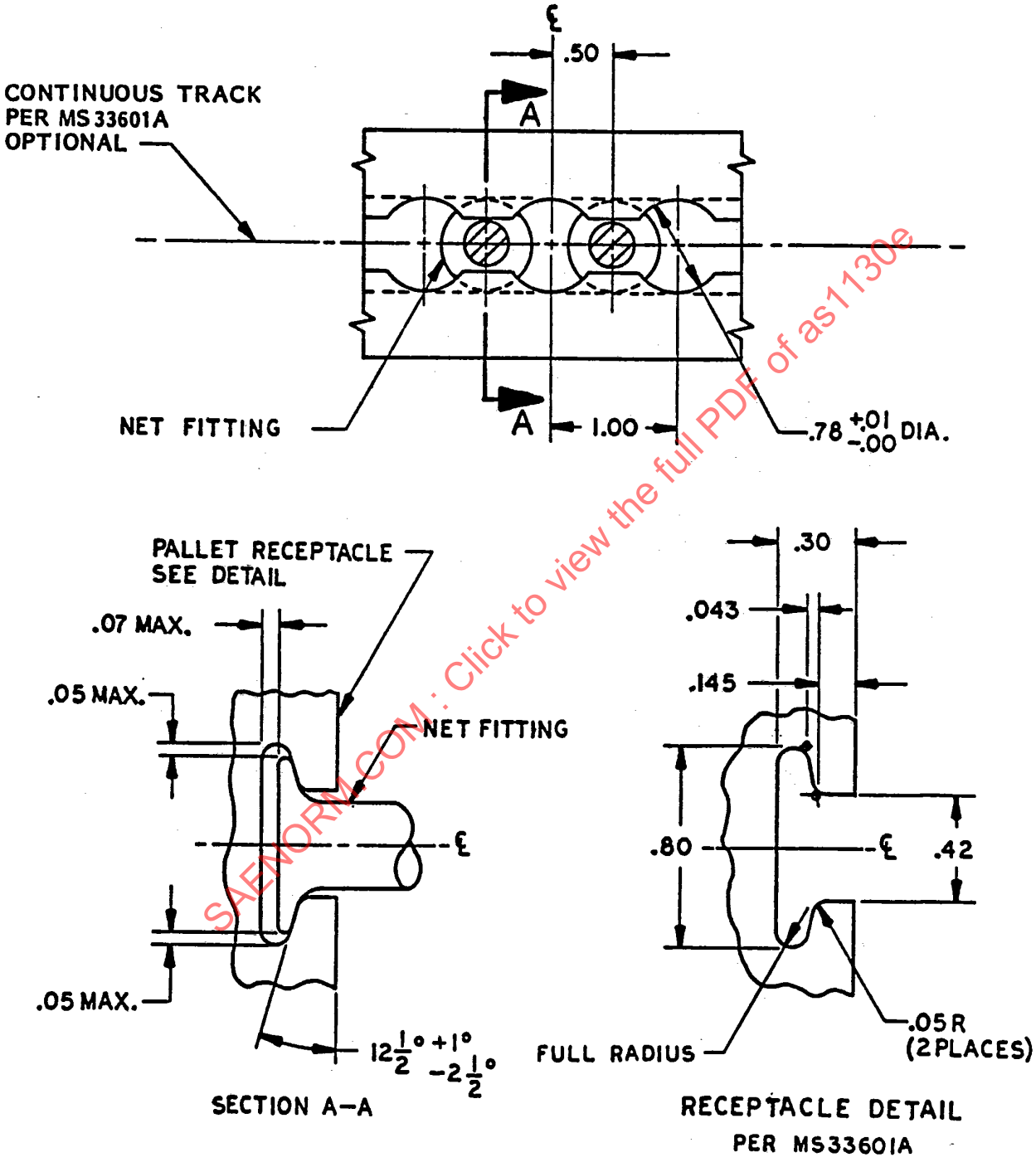
NOTE: DIMENSIONS IN INCHES

FIGURE 4 - Side Slot Detail



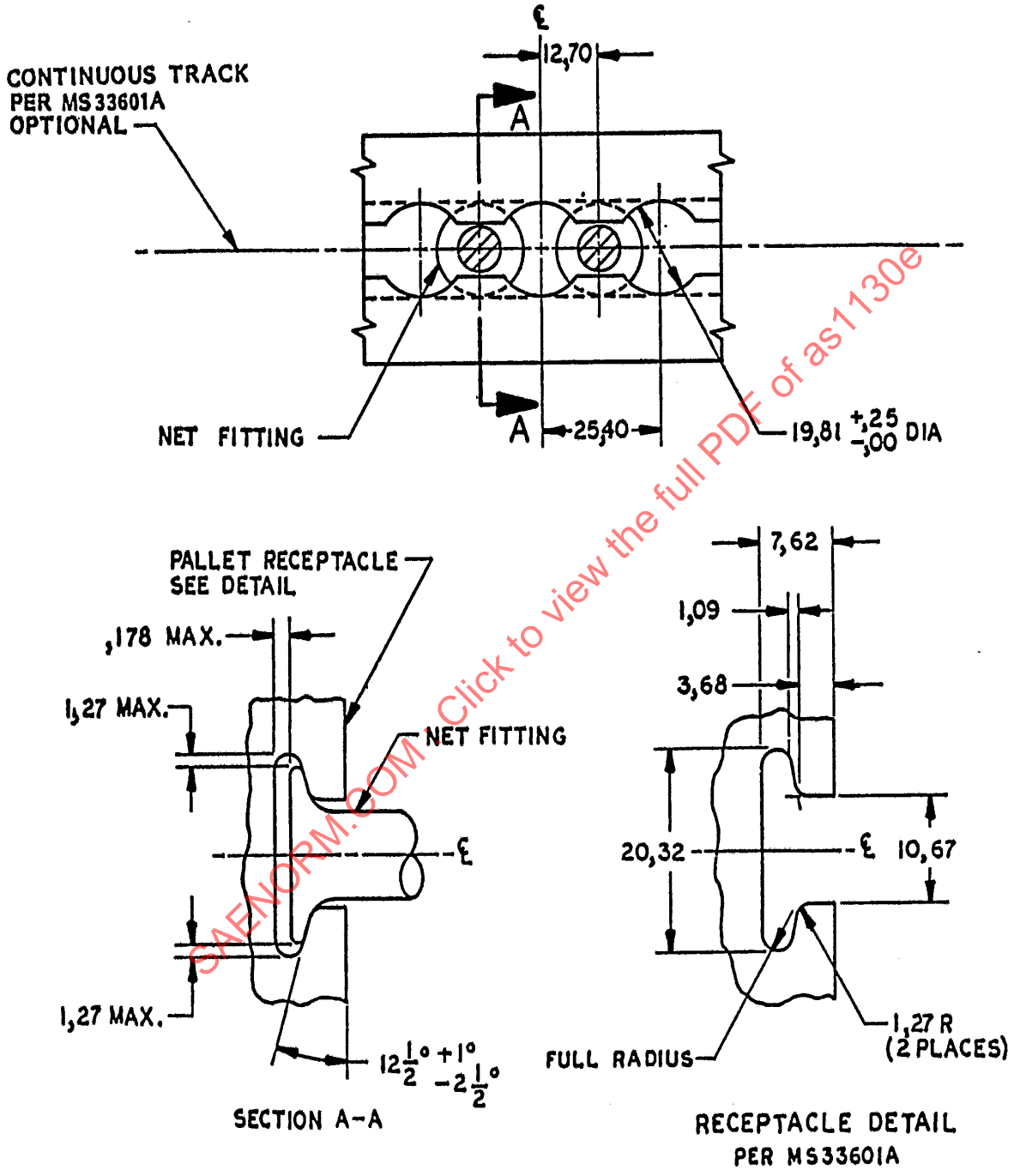
NOTE: DIMENSIONS IN MILLIMETERS

FIGURE 4 (SI) - Side Slot Detail



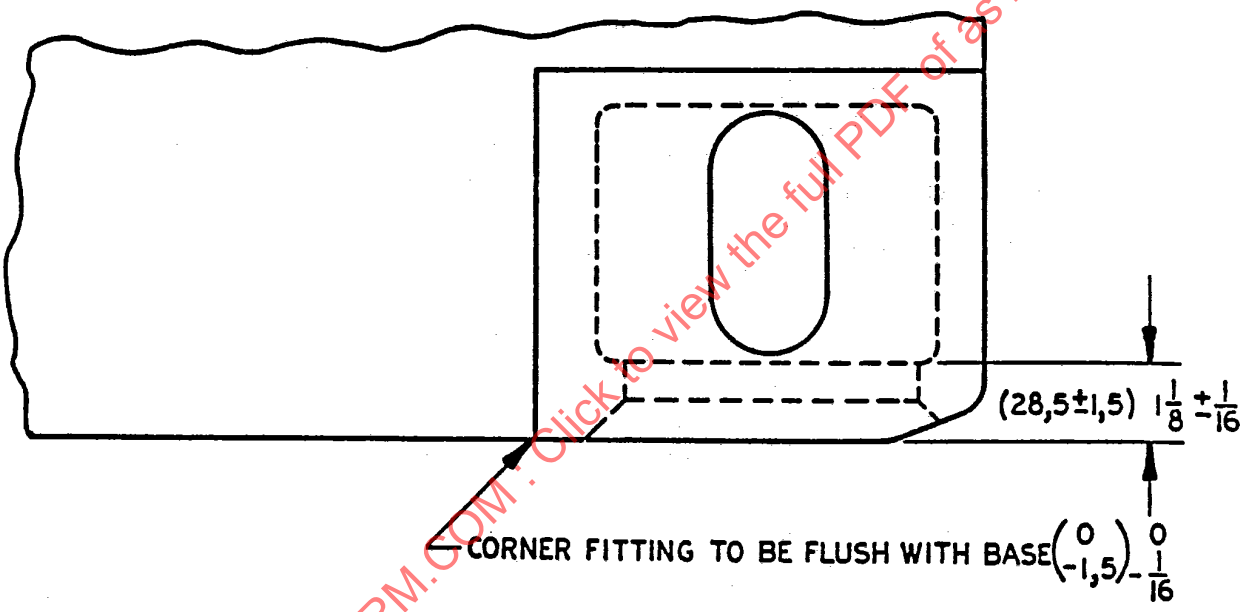
NOTE: DIMENSIONS IN INCHES

FIGURE 5 - Cargo Net Tie-Down Receptacle



NOTE: DIMENSIONS IN MILLIMETERS

FIGURE 5 (SI) - Cargo Net Tie-Down Receptacle



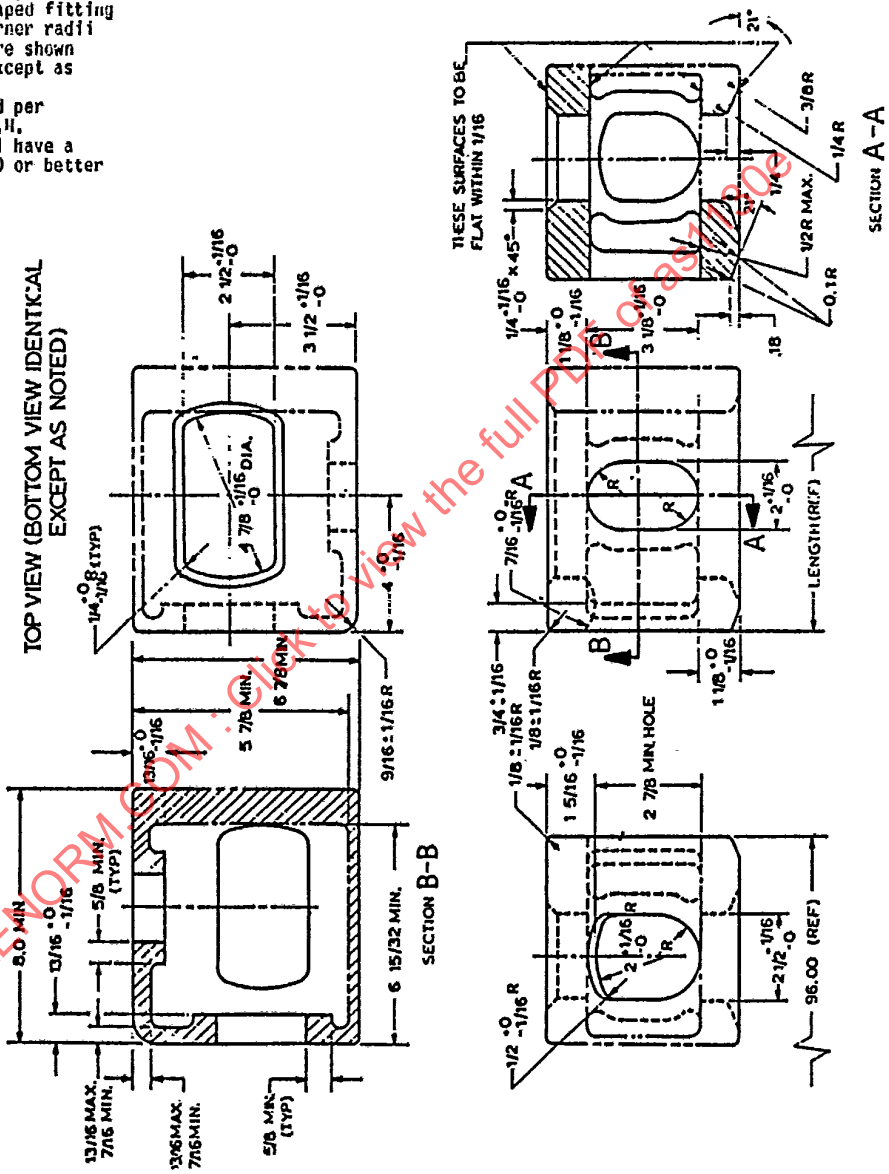
NOTES:

1. DIMENSIONS IN INCHES
2. (DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)

FIGURE 6 - Location of Bottom Corner Fitting 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 1/8 in. max except as noted
4. Four fittings required per pallet 2 L.H. and 2 R.H.
5. Outside surfaces shall have a casting surface of C30 or better



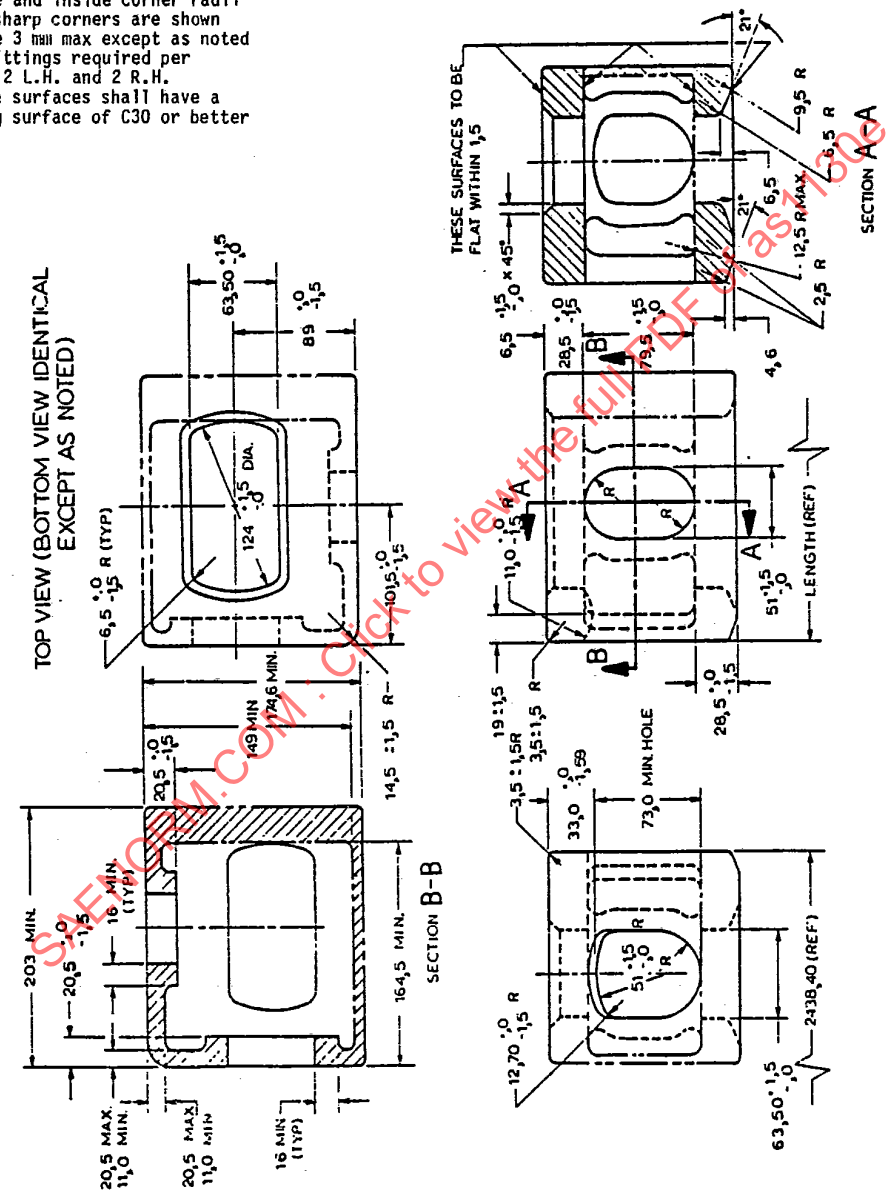
NOTE:

DIMENSIONS IN INCHES

FIGURE 7 - Flush Mounted Corner Fitting
(See Figure 6)

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 L.H. and 2 R.H.
5. Outside surfaces shall have a casting surface of C30 or better



NOTE:

DIMENSIONS IN MILLIMETERS

FIGURE 7 (SI) - Flush Mounted Corner Fitting
(See Figure 6)

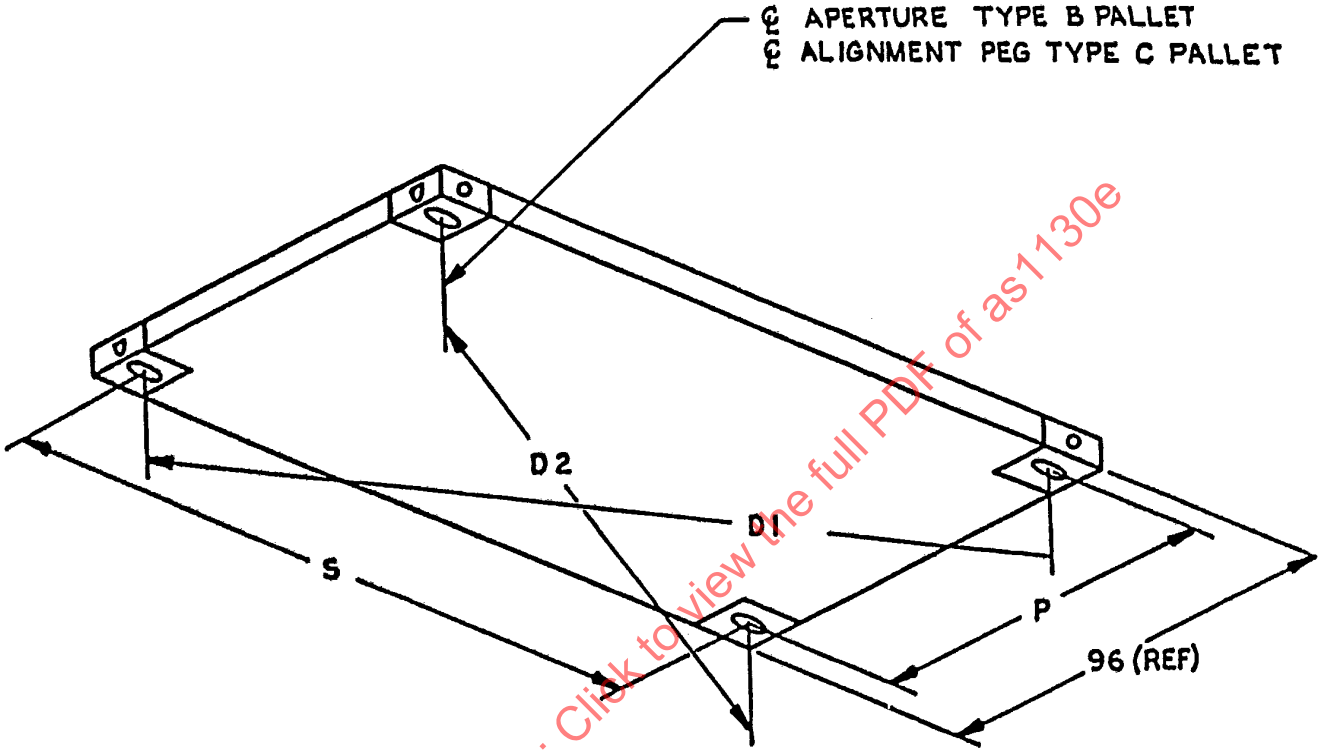


FIGURE 8 - Type B & C Pallet