SAE The Engineering Resource For Advancing Mobility
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AEROSPACE STANDARD

AS 832C

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AIR & AIR/SURFACE (INTERMODAL) GENERAL PURPOSE CONTAINERS

1. PURPOSE: This Aerospace Standard (AS) provides dimensional structural and environmental requirements for 8 x 8 ft (2.44 x 2.44 m) cross-section containers to be used in freighter versions of high-capacity fixed-wing aircraft. 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 containers. Deviation from recommended criteria should occur only after careful consideration, extensive testing and thorough service evaluation have shown alternate methods to be satisfactory.

2. SCOPE:

2.1 This document establishes two classes of containers, Type A for Air (only) and Type B for Air/Surface (Intermodal).

2.2 Container will have nominal dimensions of 8 x 8 ft cross-sections and lengths of 10, 20, 30 and 40 ft (2.44 x 2.44 x 3.05/6.1/9.15/12.2 m).

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

2.4 Air/Surface containers (Type B) are suitable for Air/Surface handling and transport systems.

a) Type IIB and IIIB shall also be acceptable in ship carriage subject to stowage in below-deck holds and stacking limitation of one container of the same type loaded on top.

b) Supplementary requirements for Type B version are found in Section 4.

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3. BASIC REQUIREMENTS:

3.1 Dimensions: External dimensions and minimum internal volume and door opening shall be as shown in Table I. Diagonal tolerances shall be as specified in Table II.

3.2 Construction:

3.2.1 Body or Box:

3.2.1.1 Body construction shall be rugged, weather tight, minimizing maintenance and original cost by having the doors, latches, and locks as the only moving parts.

3.2.1.2 All fittings and appurtenances shall be within the maximum outside dimensions of the container.

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

3.2.1.3 Container construction shall have sufficient structural strength to withstand, without permanent deformation, the static and dynamic loads and the impact shock and racking stresses encountered in normal carrier service.

3.2.1.4 At least a total of 12 sq in. (77.4 sq cm) of vent area for each 10 ft (3048 mm) length, or fraction thereof, of container shall be provided.

3.2.1.4.1 This vent will be adequately protected from cargo load shift to insure no less than 12 sq in./10 ft (77.4 sq cm/3048 mm) is available during emergency operation.

3.2.1.5 The container roof shall support without permanent deformation 660 lb (299.4 kg) applied to any 12 x 24 in. (305 x 610 mm) acting down.

3.2.2 Base:

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

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

3.2.2.2 No structure shall protrude below the bottom surface of the base.

3.2.2.3 Construction:

3.2.2.3.1 The base shall have a nominal thickness of 2 in. (50.8 mm) from the bottom surface on Type A containers only. This thickness may be varied when the base design employed results in a lighter and more durable structure capable of accepting uniform loading of 400 lb per square foot (1955 kg/m^2) when supported on conveying system of 3.2.2.3.5.

3.2.2.3.2 The base shall be enclosed on all four sides by an edge member conforming to Figs. 2, 3, and 4. The vertical surface of the container base between the restraint provisions shown in Figs. 2 and 3 shall be smooth and continuous to provide automatically latching aircraft restraint systems interface.

- The base bottom skin will 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 Figs. 3 or 3A.
- The base corners shall have a 3-in. (76.2-mm) radius in the plane of the panel.
- Corners should be readily replaceable.

3.2.2.3.3 The base should be structurally attached to the body with a minimum number of fittings easily removable and interchangeable.

3.2.2.3.4 In order to allow the container to conform to the airplane system deflected shape, the 30 ft (9.15 m) or 40 ft (12.2 m) long container base when loaded to the rated gross weight load shown in 3.3.1 shall have freedom to deflect ± 3/8 in. (± 9.5 mm) without rigid restraint by the wide wall. Base stiffness in the forward and aft direction in the plane of the base shall not exceed an EI value 3 x 10^6 lb $in.^2$ per inch (338,954 Nm^2 per m).

These 30 ft (9.15 m) and 40 ft (12.2 m) container requirements relate to the present day aircraft and may be relaxed for future aircraft.

3.2.2.3.5 The base 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 76 in. (193 cm) measured between centers with each row composed of 1.5 in. (38 mm) diameter rollers 3 in. (76.2 mm) long uncrowned with edge radius of 0.06 in. (1.5 mm) spaced on 10-in. (254 mm) centers. Container travels perpendicular to roller axis.

- Swivel casters with 1-in. (25.4 mm) diameter wheels having a contact length of 2 in. (50.8 mm) located on a 12 x 12 in. (305 x 305 mm) grid pattern. Container travel is in all directions across grid.

- Ball transfer units with 1-in. (25.4 mm) diameter balls located on a 5 x 5 in. (127 x 127 mm) grid pattern. Container level is in all directions across grid.

- For design purposes it may be assumed that while supported on these systems and being transported over the road, the container will be subjected to vertical loads of approximately 1.8g (dynamic) with a frequency of 180 cycles per min. and amplitude of 3 in. (76.2 mm).

3.2.2.3.6 The base shall comply with the following conditions:

- Ball indentation per 5.2.

- Ball casters per 5.3.

- Abrasion per 5.4.

- Base strength as per 6.4.5.

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

3.2.4 Doors:

3.2.4.1 The container shall be designed to make maximum possible internal cross-section available for loading (Table 1).

3.2.4.2 It should be possible for one man to open and close the door in no more than one-half minute.

3.2.4.3 The lower edge of the door shall not encroach on the restraint slot area shown in Fig. 4.

3.2.4.4 The door should have the minimum number of position latches and restraint attachments that will sustain the ultimate load (3.4.2) without unlatching or releasing the container contents.

3.2.4.4.1 Latches shall be located so that they cannot damage or be damaged by adjacent units should they inadvertently be left open or become open in flight.

3.2.4.4.2 No tools should be required to open or close the doors or latches.

3.2.4.4.3 The door latches and installation mechanisms should be designed to allow door operation while the container is on uneven surfaces that vary up to 0.5 in. (12.7 mm) over the width of the door opening.

3.2.4.4.4 Means should be provided to give mechanical indication that door is positively locked.

3.2.4.5 Door assemblies and components should be interchangeable.

3.2.4.6 It should be possible to lock (discourage entry) and seal door as to give visual indication of unauthorized entry.

3.2.4.7 Particular design attention should be given to prevention of water intrusion through door-to-body interface areas.

3.2.4.8 Handles, straps, or hand holds shall be provided on the door of the 10-ft (3.05 m) container to assist in manual movement of the container.

3.2.4.8.1 These devices should withstand a 1,000 lb (454 kg) pull in any direction.

3.2.4.8.2 They should provide an area equivalent to 6 in. wide by 3 in. deep (152.4 x 76.2 mm) for gripping with a gloved hand.

3.2.5 Complete Assembly:

3.2.5.1 Container shall be capable of traversing a 2 deg crest or valley with no permanent deformation or damage.

3.2.5.1.1 To meet this condition containers uniformly loaded to gross weight shall be capable of being supported at the cresting point through a roller contact of 80 in. (2032 mm) minimum width with a roller of 1.5 in. (38 mm) maximum diameter.

3.2.5.2 There shall be provision for "D" rings or equivalent, each capable of reacting a 4,000 lb (1814.4 kg) operating load applied in any direction, and spaced at approximately 24 in. (610 mm) centers around the internal periphery of the container.

3.2.5.3 In order to prevent tampering or pilferage of shipments moving under Customs control (TIR), a sealing system shall be used and will be positioned so that sealing unit will be held firmly in place when seal is affixed.

3.2.5.3.1 Doors shall be fitted with a device which shall permit simple effective Customs sealing. This device shall either be welded in the sides of doors or secured by at least two bolts, rivetted or welded to the nuts on the inside.

3.2.5.3.2 Hinges shall be made and fitted that doors cannot be lifted off the hinge pins, once shut. The screws, bolts, hinge pins, and other fasteners shall be welded to the outer parts of the hinges unless the closure system has locking devices inaccessible from the outside which, when applied, prevent the doors from being lifted off the hinge pins.

3.2.5.3.3 The container construction shall be designed so that the Customs seal is adequately protected.

3.2.5.3.4 Container construction shall be free of any recesses or voids in which cargo (or other material) can be concealed.

3.2.5.3.5 Pressure equalization devices shall be constructed so as to prevent access to the contents.

3.2.5.4 To meet agricultural requirements, exterior and interior surfaces should be as free as possible of recesses, railings, and protuberances, where pests can hide or where soil or other residues can accumulate.

3.3 Ratings:

3.3.1 The container shall be designed for the following gross weights:

3.3.1.1 10 ft (3.05 m) container 12,500 lb (5,670 kg)

3.3.1.2 20 ft (6.1 m) container 25,000 lb (11,340 kg)

3.3.1.3 30 ft (9.15 m) container 35,000 lb (15,876 kg)

3.3.1.4 40 ft (12.2 m) container 45,000 lb (20,412 kg)

3.3.2 Containers over 10 ft (3.05 m) length shall be designed for a gross weight of 14,900 lb (6758.5 kg) in any 10 ft (3.05 m) section of the container.

3.4

Design Loads:

3.4.1
Operational Loads:

3.4.1.1
Setting a design case where the container is supported on a roller system in accordance with 3.2.2.3.5, the container shall be designed to the following operational loads with the cargo center of gravity located at any point in the range specified in 3.4.7 and after these loads are applied shall exhibit no permanent deformation.

CON-TAINER SIZE	MAXIMUM UNIT GROSS WEIGHT-lb	OPERATIONAL LOADS									
		FORWARD		AFT		SIDE		UP		DOWN	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
10 ft	12,500	12,500	5,670	12,500	5,670	12,500	5,670	12,500	5,670	37,500	17,010
20 ft	25,000	25,000	11,340	25,000	11,340	25,000	11,340	25,000	11,340	75,000	34,020
30 ft	35,000	35,000	15,876	35,000	15,876	35,000	15,876	35,000	15,876	105,000	47,628
40 ft	45,000	45,000	20,142	45,000	20,412	45,000	20,412	45,000	20,412	135,000	61,236.5

3.4.1.2 Under these operational loads the maximum deflection permitted, measured at the intersection of the top and side panels of the container with the base restrained by the locks described in Fig. 7 is 1.5 in. (38 mm).

3.4.1 Ultimate Loads: Under the roller system support in accordance with 3.2.2.3.5 the container shall be designed for the following ultimate loads with the cargo center of gravity located at any point in the range specified in 3.4.7, the container may exhibit permanent deformation, but shall not rupture to the extent of discharging contents.

CONTAINER SIZE	MAXIMUM UNIT GROSS WEIGHT-lB	ULTIMATE LOADS									
		FORWARD		AFT		SIDE		UP		DOWN	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
10 ft	12,500	18,750	8,505	18,750	8,505	18,750	8,505	31,250	14,175	62,500	28,350
20 ft	25,000	37,500	17,010	37,500	17,010	37,500	17,010	62,500	28,350	125,000	56,700
30 ft	35,000	52,500	23,814	52,500	23,814	52,500	23,814	87,500	39,690	175,000	79,380
40 ft	45,000	57,500	30,618	67,500	30,618	67,500	30,618	112,000	51,030	225,000	102,060

3.4.3 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.

3.4.4 Side loads shall be reacted at the container base.

3.4.5 Up, fore, and aft loads shall be reacted by a fitting as shown in Figs. 7 and 8 inserted in the restraint slots.

3.4.5.1 The design shall allow the fore and aft loads to be reacted by the following number of load bearing slots:

3.4.5.1.1 10 ft (3.05 m) container - 2 slots

3.4.5.1.2 20 ft (6.1 m) container - 5 slots

3.4.5.1.3 30 ft (9.15 m) container - 8 slots

3.4.5.1.4 40 ft (12.2 m) container - 11 slots

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

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

3.4.5.4 Up load shall be reacted by a fitting as shown in Fig. 8 inserted in the side restraint slots.

3.4.5.4.1 The container 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.

3.4.6 End slots shall be provided in accordance with Fig. 4.

3.4.6.1 Slots shall be designed to restrain a 10 ft (3.05 m) container for ultimate forward, aft, and vertical up loads when used in conjunction with restraint fittings in accordance with Fig. 9.

3.4.6.2 Slots to be used for ground transport restraint are shown in Fig. 4. Each side of outward slots (or blocks located at same dimension) should be capable of restraining 75% of the maximum unit gross weight when loaded against a ground transport system.

3.4.7 Center of gravity shall be assumed to vary:

3.4.7.1 Plus and minus 10% of internal width measured from geometric center of enclosed space.

3.4.7.2 Plus and minus 5% of internal length measured from geometric center of enclosed space.

3.4.7.3 From 14 in. (356 mm) above lower surface of the base to midway between upper surface of floor and underside of roof.

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

4. SUPPLEMENTAL REQUIREMENTS FOR AIR/SURFACE (INTERMODAL) CONTAINERS:

4.1 Type B Containers:

4.1.1 Type IB shall incorporate fittings at the four lower corners conforming to Figs. 3B or 3C, and 5 or 5A and located according to Table II and Fig. 11 and is considered non-stackable.

4.1.2 Type IIB shall incorporate fittings at both upper and lower corners conforming to Figs. 1, 3B or 3C, and 5 or 5A and mated according to Table II and Fig. 12 and may be stacked.

4.1.3 Type IIIB are 10 and 20 ft (3.05 and 6.1 m) containers and shall incorporate forklift tineways located per Fig. 6 and fittings at upper and lower corners per Figs. 1, 3B or 3C, and 5 or 5A located according to Table II and Fig. 12.

4.1.4 In the case of containers with top corner fittings, the top of the container should be 1/4 in. (6.4 mm) below the top face of these fittings.

4.1.5 Where recessed lower corner fitting is employed, in order to ensure an easy transference on conveying systems, the difference in planes of the corner fitting related to the edge member shall be compensated by blending the edge member at 21 deg to the plane of the recessed corner fitting (Fig. 3B).

4.2 Design Ground Operational Loads (Dynamic):

4.2.1 For design purposes, the Type B container base under the following operational design load criteria, supported at the lower corner fittings, and being transported over the road, will be subjected to these loads at a frequency of 180 cycles per minute and amplitude of 3 in. (76.2 mm).

4.2.1.1 10 ft (3.05 m) container 22,500 lb (10,206 kg)

4.2.1.2 20 ft (6.1 m) container 45,000 lb (20,412 kg)

4.2.1.3 30 ft (9.15 m) container 63,000 lb (28,577 kg)

4.2.1.4 40 ft (12.2 m) container 81,000 lb (36,742 kg)

4.2.2 Due to the flat bottom configuration, for surface transport or when stacked, ISO type adapter fittings or other separator means should be attached to the applicable corner fittings.

4.2.3 Under the design consideration of 4.2.1, the base shall not deflect more than the thickness of the adapter fittings.

4.3 Ground Operational Loads (Static):

CONTAINER SIZE ft	CONTAINER SIZE m	MAXIMUM UNIT GROSS WEIGHT-LB	GROUND OPERATIONAL LOADS LB	GROUND OPERATIONAL LOADS kg
10	3.05	12,500	25,000	11,340
20	6.1	25,000	50,000	22,680
30	9.15	35,000	70,000	31,752
40	12.2	45,000	90,000	40,824

4.3.1 Ends shall be of sufficient strength to withstand the applicable load as shown in 4.3 under "Maximum Unit Gross Weight".

4.3.1.1 When restrained at the lower four corners the deflection at intersection of top and the measured end wall shall not exceed 1.5 in. (38 mm).

4.3.2 The Type B containers shall be capable of withstanding, without permanent deformation, a uniformly distributed operational down load equal to those shown in 4.3 while supported by slings or frame connected to the four base corner fittings.

4.3.3 The Type IIB and IIIB containers shall support an operational down load equal to those shown in 4.3 while supported from the four top fittings.

4.3.4 Type IIIB container shall be capable of withstanding an operational down load equal to 4.3 while supported by a forklift truck.

4.3.5 Type IIB and IIIB containers shall be capable of statically supporting an operational down load of twice the gross weight equally divided among and through the horizontal faces of the four top corner fittings.

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

5. ENVIRONMENTAL CRITERIA:

5.1 Materials:

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

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

5.1.3 All components of the container 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 container shall be so designed that it will withstand handling common to Air/Surface freight terminal and ramp operations.

5.2 Ball Load Capability: The container base surface or a representative portion thereof shall be capable of being subjected to 900 lb (408 kg) on a one-inch (25.4 mm) diameter steel ball without permanent indentation in excess of 0.020 in. (0.51 mm).

5.3 Ball Caster Load Capability: The base or a representative portion thereof shall be capable of being subjected to a uniformly distributed load of 210 lb (95.5 kg), supported by 4 one-inch (25.4-mm) diameter steel ball casters on a 5-in. (127 mm) grid pattern. The base shall be moved over the casters for a minimum of 5,000 passes along a fixed line in each of two directions, 90 deg to, and intersecting each other. The length of the stroke shall be approximately 12 in. (305 mm). At the conclusion of the test, there shall be no evidence of deterioration of the base/ball caster interface surface.

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

After 1,000 Revolutions - 0.015 g
After 2,000 Revolutions - An additional 0.005 g
After 5,000 Revolutions - An additional 0.030 g
Up to a total of 0.050 g

5.5 Rain Requirements:

5.5.1 Water shall be directed over the container and around the door and vents to simulate a heavy driving rain equivalent to what would be experienced by a container secured to an open truck and being transported at 50 mph (80 kmh).

5.5.2 Upon completion of test as in 6.4.7, no water shall have entered container.

5.6 Weight Limits:

5.6.1 The tare weight of the container assembly (base plus body) shall be a minimum consistent with the requirements and within limits of sound design practices.

5.6.2 The tare weight objective for the container should range from 1.2 to 1.8 lb/cu ft (19 to 29 kg/m^3) based on external volumes.

5.7 Materials and Processes:

5.7.1 The materials and processes selected should give consideration to the extremely hard usage to which the container 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.

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

5.7.3 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:

6.1.1 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.

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

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

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 container so tested may not be used in service until all component parts are inspected and those that exhibit permanent deformation are replaced.

6.2 Test Criteria:

6.2.1 A container 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.

6.2.1.1 Within the test procedure section, the words "no permanent deformation shall occur" are intended to mean that upon completion of the subject test(s) the container shall show neither permanent deformation or abnormality which will render it unsuitable for use and the dimensional requirements affecting handling, securing, and/or interchange shall be satisfied.

6.2.2 Permanent deformation is permitted under ultimate load conditions. A container 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.

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 3.2.2.3.5. Latches and guide-rails of suitable strength shall be provided to guide the container along the conveyor and secure it at its latch points. The test system shall be of sufficient length to permit cycling of the longest container to be tested.

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

6.3.3 An industrial truck or equivalent equipment capable of a maximum load of 12,000 lb (5,443 kg) on one axle with a minimum wheel width of 7 in. (178 mm) and a maximum footprint area of 22 sq in. (142 sq cm) per wheel on 30-in. (762-mm) wheel centers shall be provided.

6.4 Test Procedure - Operational Loads:

6.4.1 End Panel Strength and Longitudinal Restraint:

6.4.1.1 The container under test shall be latched to the aircraft system or its equivalent.

6.4.1.1.1 The number of latches shown in 3.4.5.1 shall be engaged on one side and adjusted by suitable means to assure contact with the end of the latch receptacle slot.

6.4.1.1.2 A longitudinal force equal to the maximum payload shall be evenly distributed over one end panel.

6.4.1.1.3 No permanent deformation or failure shall occur.

6.4.1.1.4 Should their structure not be identical, both ends shall be tested for restraint and panel load in the same manner.

6.4.1.2 Repeat 6.4.1 for 10 ft (3.05 m) containers using only restraints in fore and aft slots per Fig. 9.

6.4.2 Side Panel Strength and Lateral Restraint:

6.4.2.1 With the container on the aircraft system or its equivalent, 50 - 60% of all the latches equally distributed on both sides shall be engaged and adjusted by suitable means to assure vertical restraint.

6.4.2.1.1 A lateral force equal to maximum payload shall be applied uniformly over the inner surface of the side panel.

6.4.2.2 Should their structure not be identical, both sides shall be tested.

6.4.2.3 No permanent deformation or damage shall occur.

6.4.2.4 The deflection at the intersection of the top and side panel shall not exceed 1.5 in. (38 mm).

6.4.3 Roof Panel Strength and Vertical Restraint:

6.4.3.1 The container shall be suspended upside down from the aircraft loading system or its equivalent.

6.4.3.1.1 Between 50 - 60% of the total number of latches equally distributed on both sides shall be engaged and adjusted by suitable means to assure contact when the load is applied.

6.4.3.1.2 The container shall have a load equal to the maximum payload uniformly distributed over the inside of the roof.

6.4.3.1.3 No permanent deformation or damage shall occur.

6.4.3.2 This test shall be repeated for 10 ft (3.05 m) containers using only restraint in accordance with Fig. 9.

6.4.4 A uniformly distributed load of 660 lb (300 kg) acting down on the top of the container shall be applied to any 12 x 24 in. (304.8 x 609.6 mm) area of the roof.

6.4.4.1 No permanent deformation shall occur.

6.4.5 Base Strength:

6.4.5.1 Container shall have the base resting on a surface of sufficient strength and continuity to adequately support the container floor.

6.4.5.1.1 An industrial truck loaded to an axle weight of not less than 12,000 lb (5,443 kg) (including the weight of the truck) or 6,000 lb (2,721.5 kg) per wheel, applied to a contact area not greater than 22 sq in. (141.9 sq cm) assuming a wheel width of not less than 7 in. (177.8 mm) and wheel centers of 30 in. (762 mm) shall then be maneuvered over the entire floor of the container to load the container to maximum gross weight.

6.4.5.1.2 An industrial truck loaded to 9,000 lb (4,082.5 kg) per wheel shall then be maneuvered over the area extending 1.5 ft (457.2 mm) inside door.

6.4.5.1.3 Containers of 30 and 40 ft (9.15 and 12.2 m) length shall be loaded to their maximum gross weight per 3.3.1 and shall be supported on bars placed on a smooth floor. A bar 3/4 in. (19 mm) radius of a 3/8 in. (9.5 mm) height shall support the container across the width at each end and a third bar with a 3/4 in. (19 mm) radius of a 3/4 in. (19 mm) height supporting the container across the width at the center of the container length. The container base shall contact the floor at a distance of 6 ft ±1 ft. (1.8 ± 0.3 metres) from the end supporting bars.

6.4.5.1.4 No permanent deformation shall occur.

6.4.5.2 For Type B containers while supported at the four bottom corners:

6.4.5.2.1 Repeat test of 6.4.5.1.1.

6.4.5.2.2 Repeat test of 6.4.5.1.2. For this test, the door sill should be continuously supported for the width of the container. For the purpose of this test, the support member shall be no wider than 6 in. (152 mm).

6.4.5.2.3 The container shall be loaded under 4.2.1; no permanent deformation shall occur.

6.4.5.2.4 When container is loaded to maximum gross weight under 3.3.1, maximum deflection shall not exceed one inch (2.54 cm).

6.4.5.3 While retained on the aircraft loading system or its equivalent (3.2.2.3.5), the floor shall be uniformly loaded to 1,200 lb per sq ft (.586 kg per sq cm).

6.4.5.3.1 The load shall be applied to an area 5 ft (1,524 mm) wide centered in the container and the load shall equal but not exceed three times maximum payload.

6.4.5.4 The container shall be uniformly loaded to gross weight and cycled one hundred times over a substantially level test system per 3.2.2.3.5 at a minimum speed of 60 ft (18.3 m) per minute.

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

6.4.5.4.2 The rollers used in the test section shall conform to 3.2.2.3.5. 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 .02 at 1.0g loading.

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

6.4.5.4.4 Each cycle shall be equal to twice container length.

6.4.5.4.5 At test speed draw bar pull shall be periodically recorded during cycling. Maximum allowable draw bar pull shall be 3% of gross weight. Maximum increase in draw bar pull during cycling shall not exceed 0.5% of gross weight.

6.4.5.5 When the Type A or B container is loaded to gross weight and supported or an aircraft system having an uneven surface varying at least 0.50 in. (12.7 mm) or a Type B container is supported at the lower corners, the doors shall be fully opened or closed for three complete cycles.

6.4.5.5.1 The doors shall open and close with no prevalent binding and the locks shall engage and disengage with ease.

6.4.5.6 Cargo tie-down rings shall be tested by applying a 4,000 lb (1,814 kg) tension load at 45 deg to horizontal and vertical planes passing through the ring attachment.

6.4.6 Resistance to Racking: The container shall be loaded to gross weight. It shall be restrained at the base along one side against movement sideways.

6.4.6.1 The top edge of the opposite side of the container shall be subjected to horizontal uniformly distributed forces along its length sufficient to reduce to zero the pressure between the bottom of the container and the aircraft system on the side opposite to that which is restrained against sideways movement.

6.4.6.2 The container shall be considered satisfactory if no permanent deformation results from the above loading.

6.4.7 To ensure watertightness, all exterior surfaces of the walls, roof, and floor of the container shall be simultaneously sprayed for 15 min. with jets of water at a nozzle pressure of not less than 15 psi (103.4 kPa) gauge.

6.4.7.1 A sufficient number of jets shall be placed 5 ft (1,524 mm) from the container to insure complete spray coverage of all surfaces at an impingement rate corresponding to 2 in. (50.8 mm) of rain per hour.

6.4.7.2 At the conclusion of the test if the interior is free from visible moisture, the container shall be considered satisfactory.

6.4.8 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 container during the design life of the container.

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

6.4.9.1 At the end of 48 hr, the condition of the closed container shall be evaluated while the structure is at or near the test temperature.

6.4.9.2 Doors must be operable with seals intact.

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

6.4.9.4 At the end of 48 hr, the condition of the closed container shall be evaluated while the structure is at or near the test temperature.

6.4.9.5 Doors must be operable with seals intact.

6.4.10 Lifting and Stacking

6.4.10.1 Type B containers shall be loaded to twice gross weight and lifted from the bottom corner fittings by using slings of a length giving an angle of 30 deg to the vertical.

6.4.10.1.1 After lifting, the container shall be suspended for not less than 5 min. and then lowered to the ground.

6.4.10.1.2 Permanent deformation shall not occur.

6.4.10.1.3 Repeat on Type IIB and IIIB containers, lifting from top corner fittings vertically for sizes 20, 30, and 40 ft (6.1, 9.15 and 12.2 m) and at 30 deg to vertical on 10 ft (3.05 m) size.

6.4.10.2 Type IIB containers shall be loaded to twice gross weight and lifted clear of the ground by using a forklift truck of suitable capacity.

6.4.10.2.1 After lifting, the container shall be suspended for not less than 5 min. and then lowered to the ground.

6.4.10.2.2 Permanent deformation shall not occur.

6.4.10.3 Type IIB and IIIB containers shall be subjected to a down load equal to twice gross weight equally divided among the top faces of the upper corner fittings. Permanent deformation shall not occur.

6.4.11 Type B End Panel Test:

6.4.11.1 Type B containers shall have the test of 6.4.1 repeated with the container secured to mating fittings used on ISO container ground handling equipment on chassis and rail cars.

6.4.11.2 A longitudinal force equal to the maximum unit gross weight shall be evenly distributed over one end panel.

6.4.11.3 Deflection should not exceed 1.5 in. (38 mm) measured at the intersection of top and measured end wall.

6.5 Production Containers: 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.

7. MARKING REQUIREMENTS:

7.1 Provisions should be made for identifying the container with standard markings established by the International Organization for Standardization (ISO) and International Air Transport Association (IATA).

7.1.1 ISO Marking: These markings consist of 17 characters to indicate owner, serial number, type, size, and country. The characters are alpha/numeric and require a computer check digit. The maximum gross weight and tare weight are also required. Such ISO markings are shown on the upper right-hand corners and on the ends and shall include a symbol to indicate an AIR Container as shown in Fig. 13.

7.1.2 IATA Marking: The markings for aircraft containers with 8 x 8 ft (2.44 x 2.44 m) cross-sections are shown on the top left hand on all four corners of the container in such a manner that good readability is ensured under all phases of handling.

B--------

ID CODE: .....

Actual Tare Wt.....kg/.....lb

Vol.: .....cu m/.....cu ft

I.D. Lettering not less than 4 in. (10 cm) high.

Other Lettering not less than 1 in. (2.5 cm) high.

7.2 General Marking: Manufacturer's markings should indicate at least the following information with positioning optional and lettering approximately 0.25 in. (6.35 mm) high:

Manufacturer: .....
(Name and Country)

Part Number: .....

Certification: .....

8. NOTES:

8.1 Marginal Indicia: The phi (Ø) symbol is used to indicate technical changes from the previous issue of this Standard.

PREPARED BY

SAE COMMITTEE AGE-2, CIVIL AIRCRAFT GROUND SUPPORT EQUIPMENT

TABLE I

EXTERNAL DIMENSIONS, INTERNAL VOLUME AND DOOR OPENING

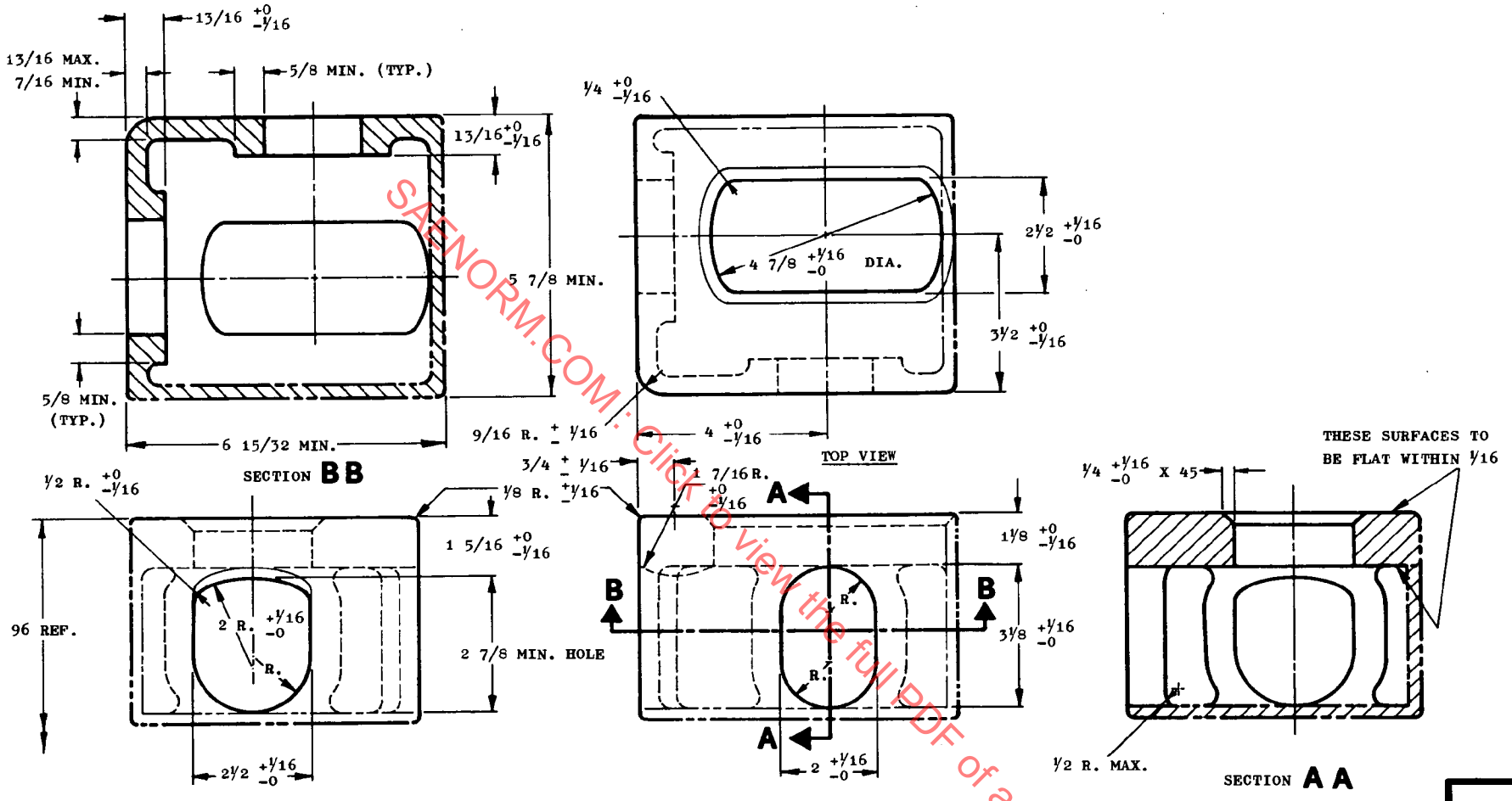
OVERALL LENGTH		OVERALL WIDTH		OVERALL HEIGHT		MINIMUM DOOR WIDTH		MINIMUM DOOR HEIGHT		MINIMUM INTERNAL VOLUME	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	cu ft	cu m
+0 480 -3/8	+0 12,192 -10	+0 96 -3/16	+0 2438 -5	+0 96 -3/16	+0 2438 -5	90	2286	84	2134	2090	59,189
+0 359-1/4 -3/8	+0 9125 -10	+0 96 -3/16	+0 2438 -5	+0 96 -3/16	+0 2438 -5	90	2286	84	2134	1560	44,179
+0 238-1/2 -1/4	+0 6058 -6	+0 96 -3/16	+0 2438 -5	+0 96 -3/16	+0 2438 -5	90	2286	84	2134	1040	29,453
+0 117-3/4 -3/16	+0 2991 -5	+0 96 -3/16	+0 2438 -5	+0 96 -3/16	+0 2438 -5	90	2286	84	2134	490	13,877

TABLE II

DIAGONAL TOLERANCES

TYPE	OVERALL LENGTH		S		P		K_1max		K_2max	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
TYPE A (Fig. 10)	480	12,192					3/4	19	1/2	13
	359-1/4	9125					5/8	16	1/2	13
	238-1/2	6058					9/16	14	1/2	13
	117-3/4	2991					1/2	13	1/2	13
TYPE IB (FIG. 11) TYPE IIB TYPE IIIB (Fig. 12)	480	12,192	471-7/8	11,985	88-31/32	2259	3/4	19	1/2	13
	359-1/4	9125	351-1/8	8918	88-31/32	2259	5/8	16	1/2	13
	238-1/2	6058	230-7/16	5853	88-31/32	2259	1/2	13	1/2	13
	117-3/4	2991	109-23/32	2787	88-31/32	2259	3/8	10	1/2	13

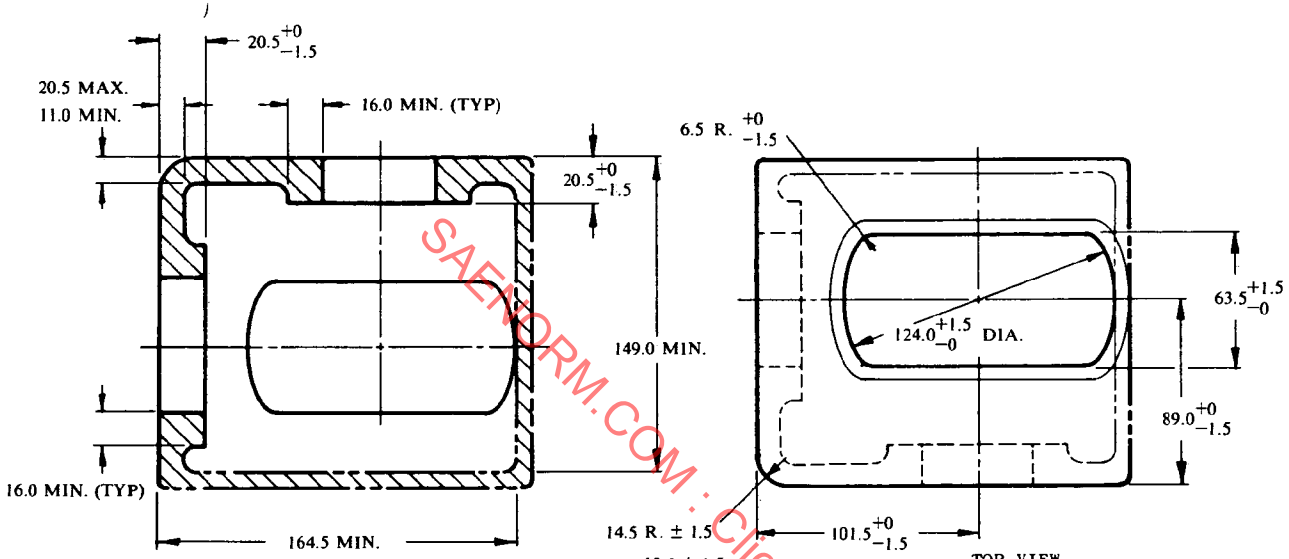
For definition of S, P, and D see Figs. 10, 11, and 12.
$K_1 = D_1-D_2$ or D_2-D_1 or D_3-D_4 or D_4-D_3
$K_2 = D_5-D_6$ or D_6-D_5



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. MAXIMUM EXCEPT AS NOTED.
4. FOUR FITTINGS REQUIRED PER CONTAINER, 2 R.H. - 2 L.H.

TOP CORNER FITTING
FIGURE 1



NOTES

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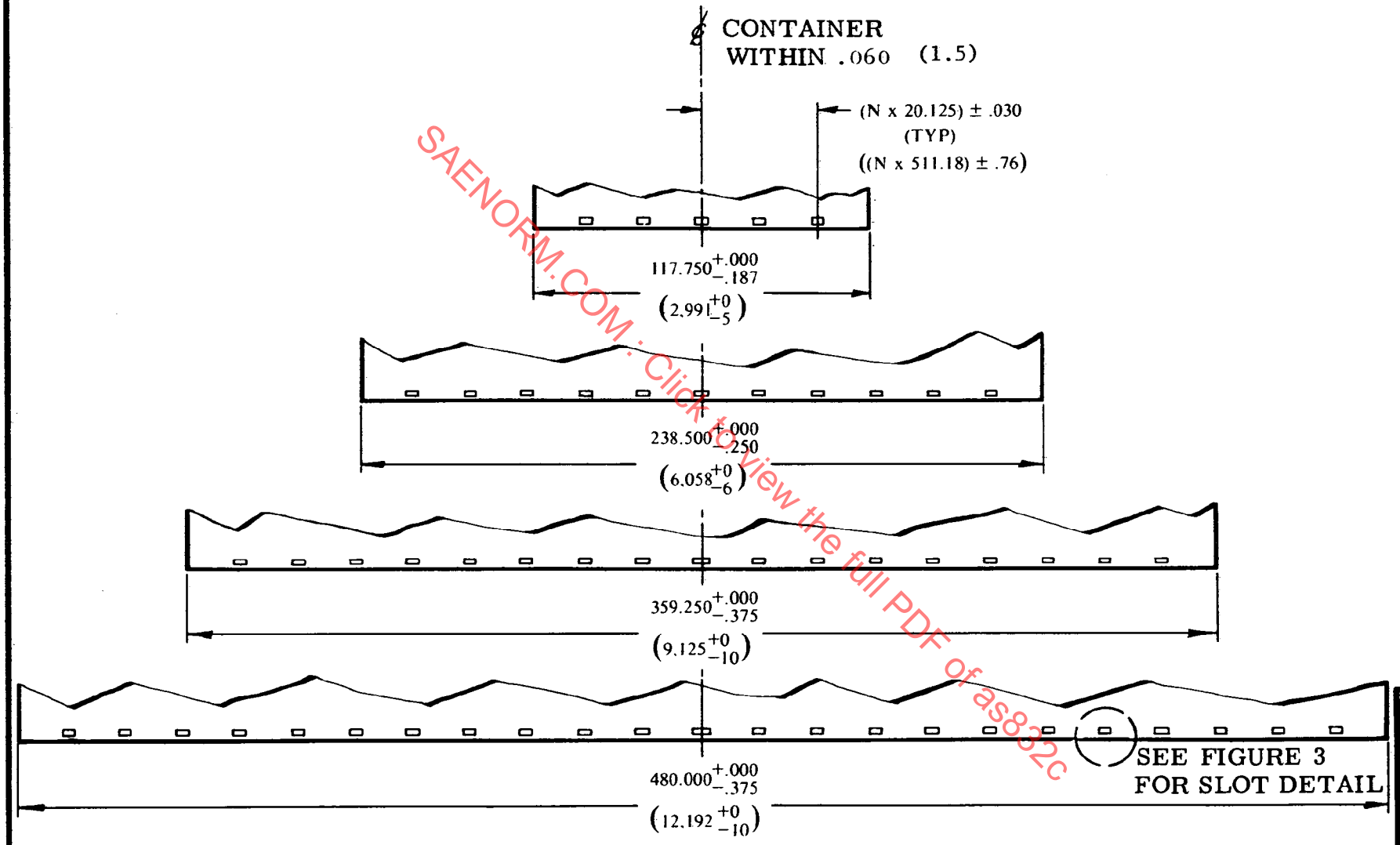
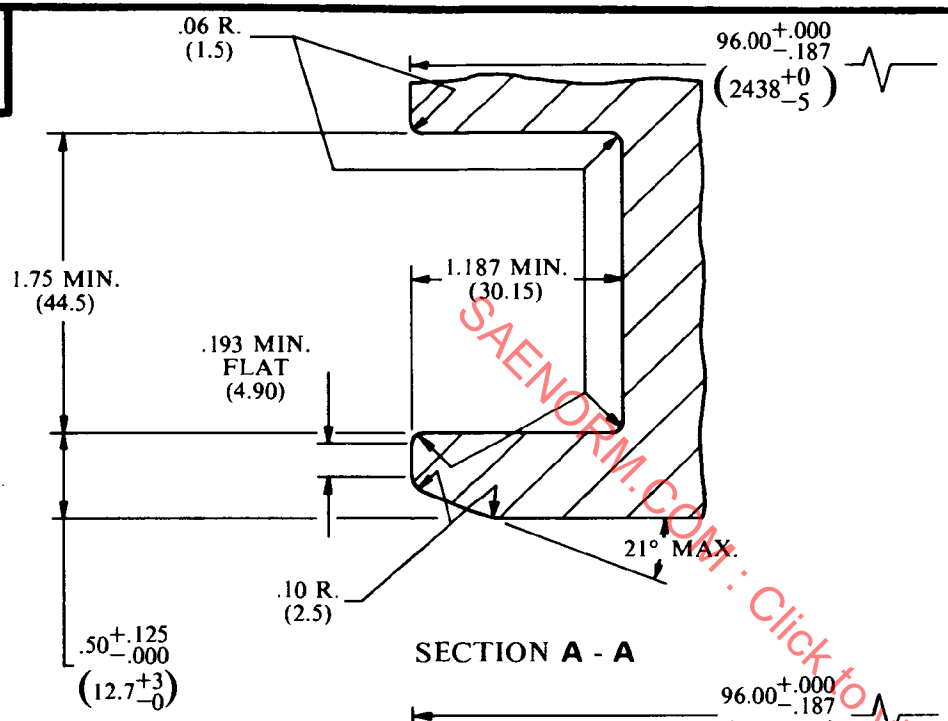
2. PHANTOM LINES (═ ═ ═) SHOW OPTIONAL WALLS, WHICH MAY BE USED TO DEVELOP A BOXED SHAPED FITTING.
3. OUTSIDE AND INSIDE CORNER RADII, WHERE SHARP CORNERS ARE SHOWN MUST BE 3 MM MAXIMUM EXCEPT AS NOTED.
4. FOUR FITTINGS REQUIRED PER CONTAINER, 2 R.H. - 2 L.H.

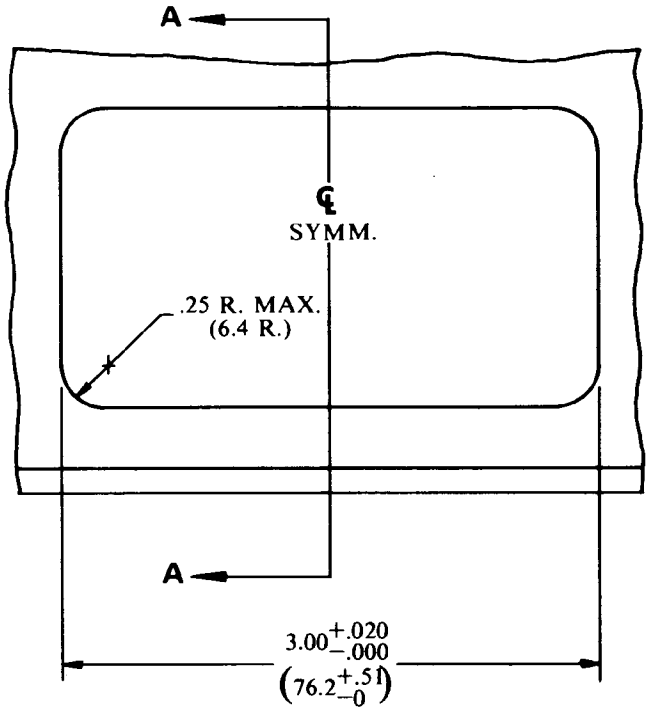
TOP CORNER FITTING
(DIMENSIONS IN MM)
Ø FIGURE 1 (SI)

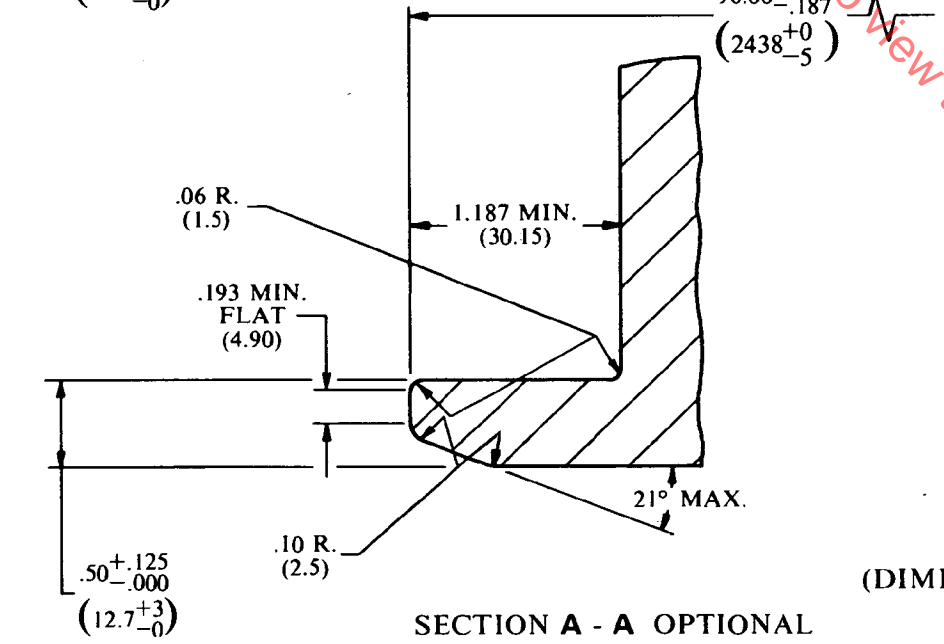


SIDE RESTRAINT SLOTS LOCATION
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)
FIGURE 2



SECTION A - A

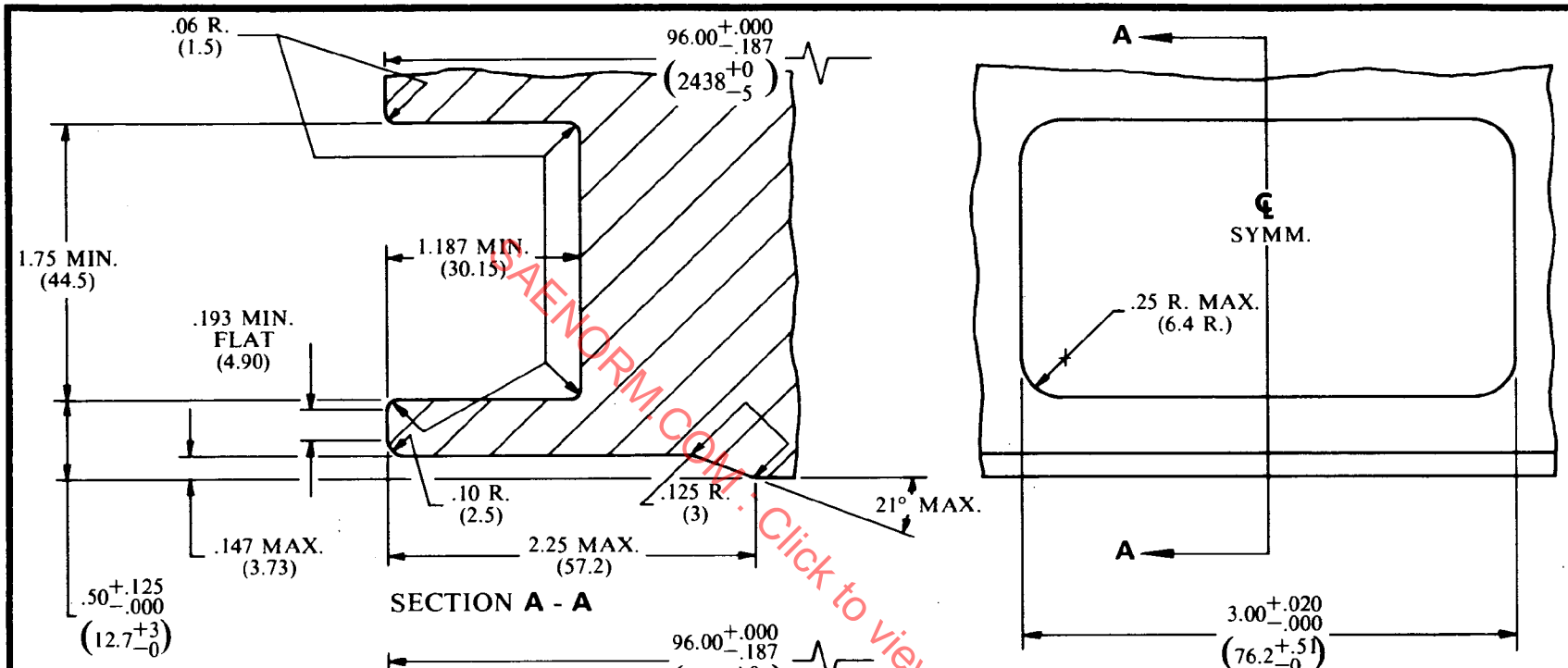


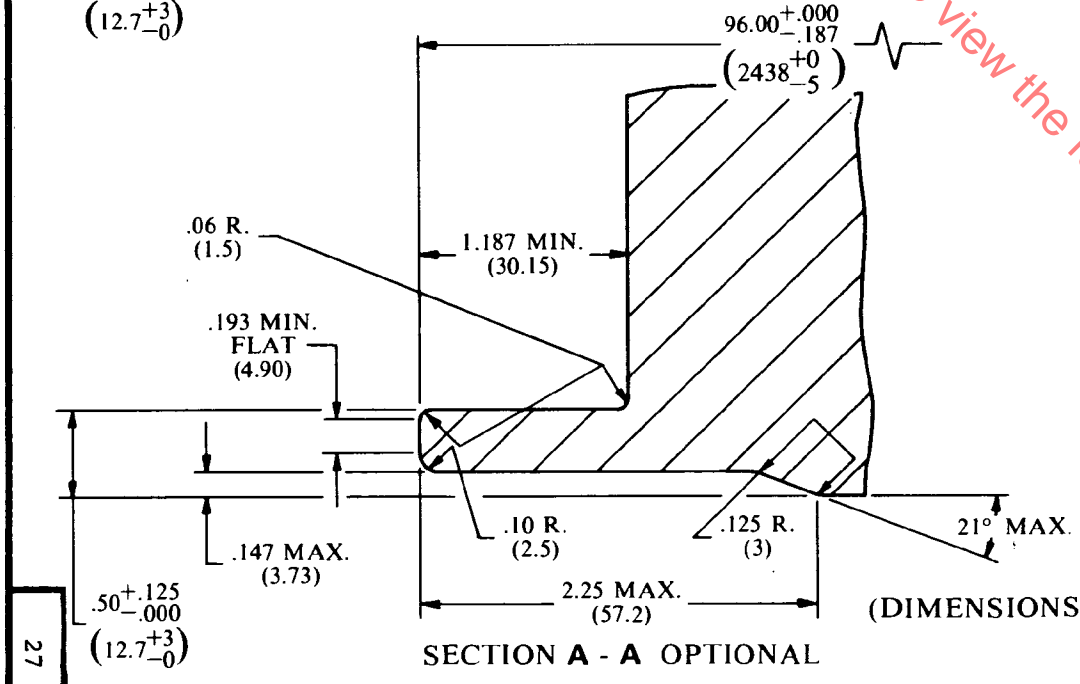


SECTION A - A OPTIONAL

SIDE SLOT DETAIL
TYPE A CONTAINER
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)

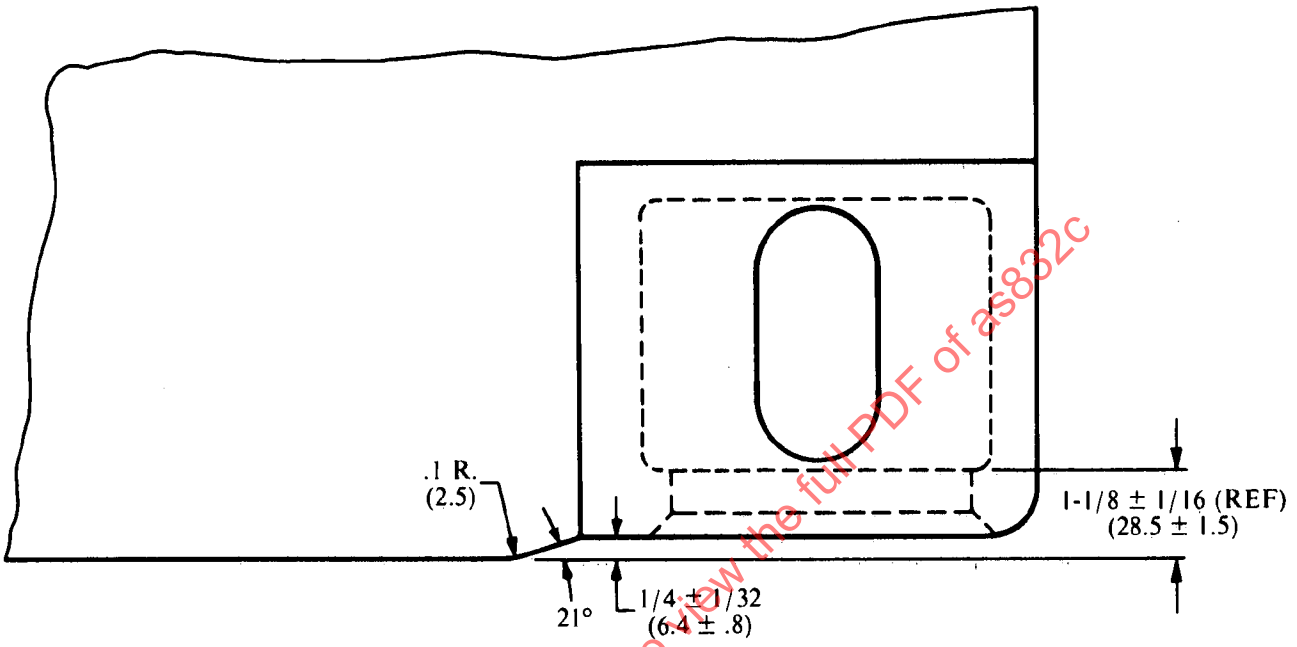
FIGURE 3





SIDE SLOT DETAIL
RECESSED EDGE OPTION
TYPE A CONTAINER
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)

FIGURE 3A

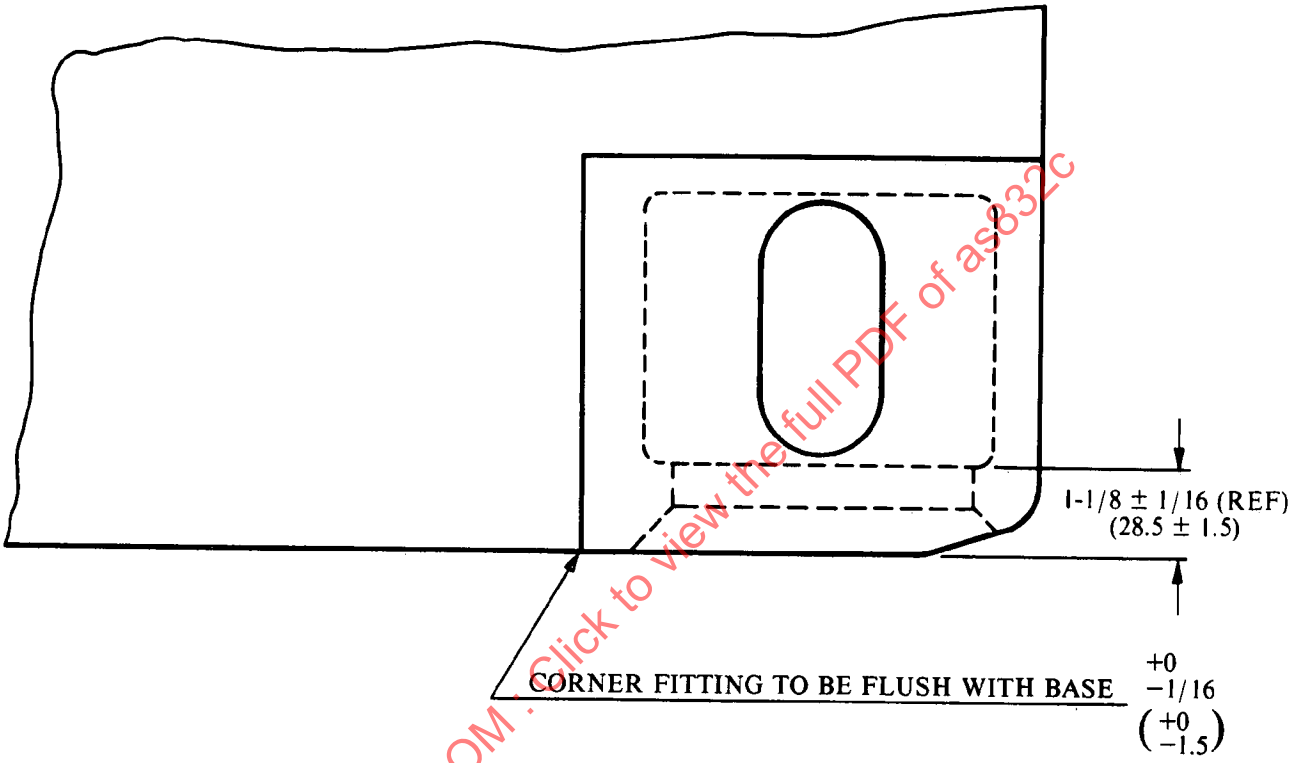


Note 1:
This typical configuration is constant all around the juncture of the corner fitting with the base rail.

Note 2:
Blend all lower edges with a minimum .1 radius (2.5).

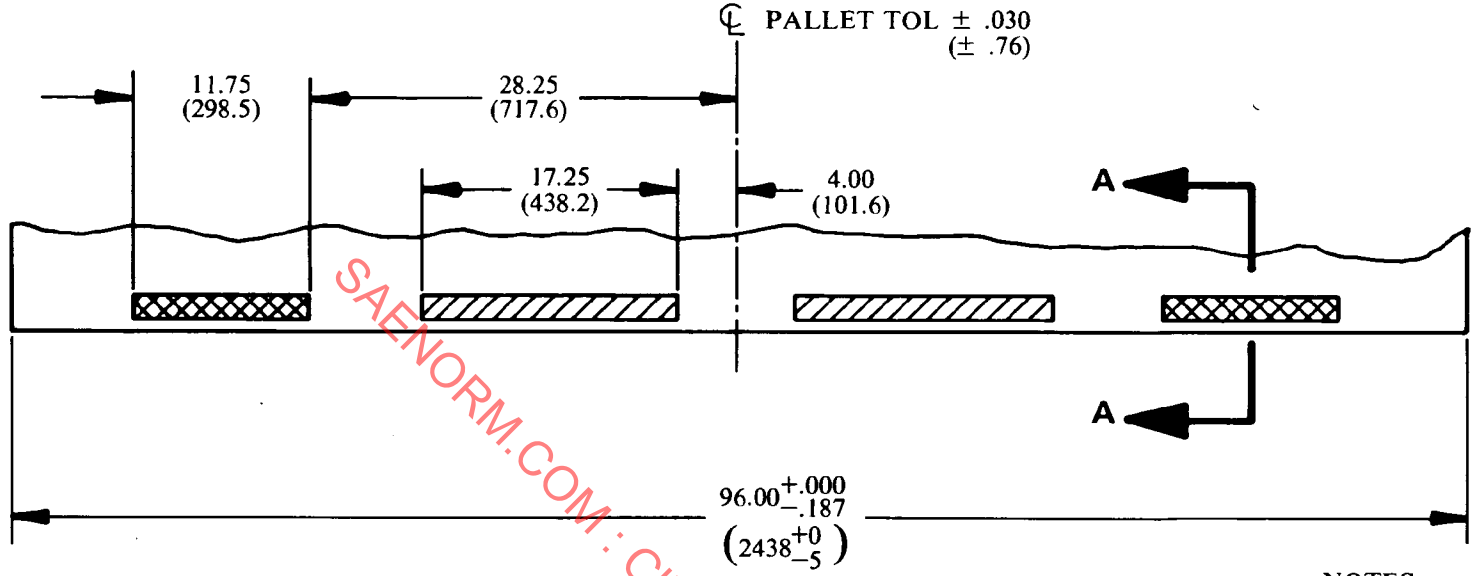
RECESSED CORNER FITTING
INTERFACE DETAIL OPTIONAL
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)

FIGURE 3B



LOCATION OF BOTTOM CORNER FITTING
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS SHOWN IN PARENTHESES)

FIGURE 3C



NOTES

TOL ± .030 (±.76) UNLESS OTHERWISE NOTED

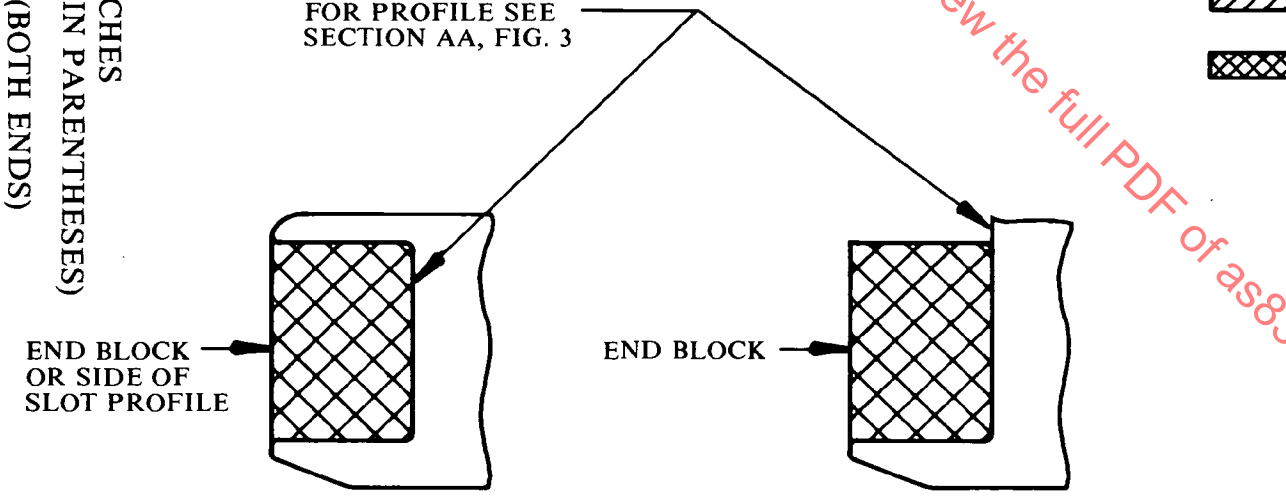
SLOTS OR CLEAR AREA

SLOTS TO BE USED FOR GROUND TRANSPORT RESTRAINT. AREA SHOWN TO BE CLEAR FOR AIRCRAFT/ GROUND EQUIPMENT LOCK INTER-FACE.

END SLOTS

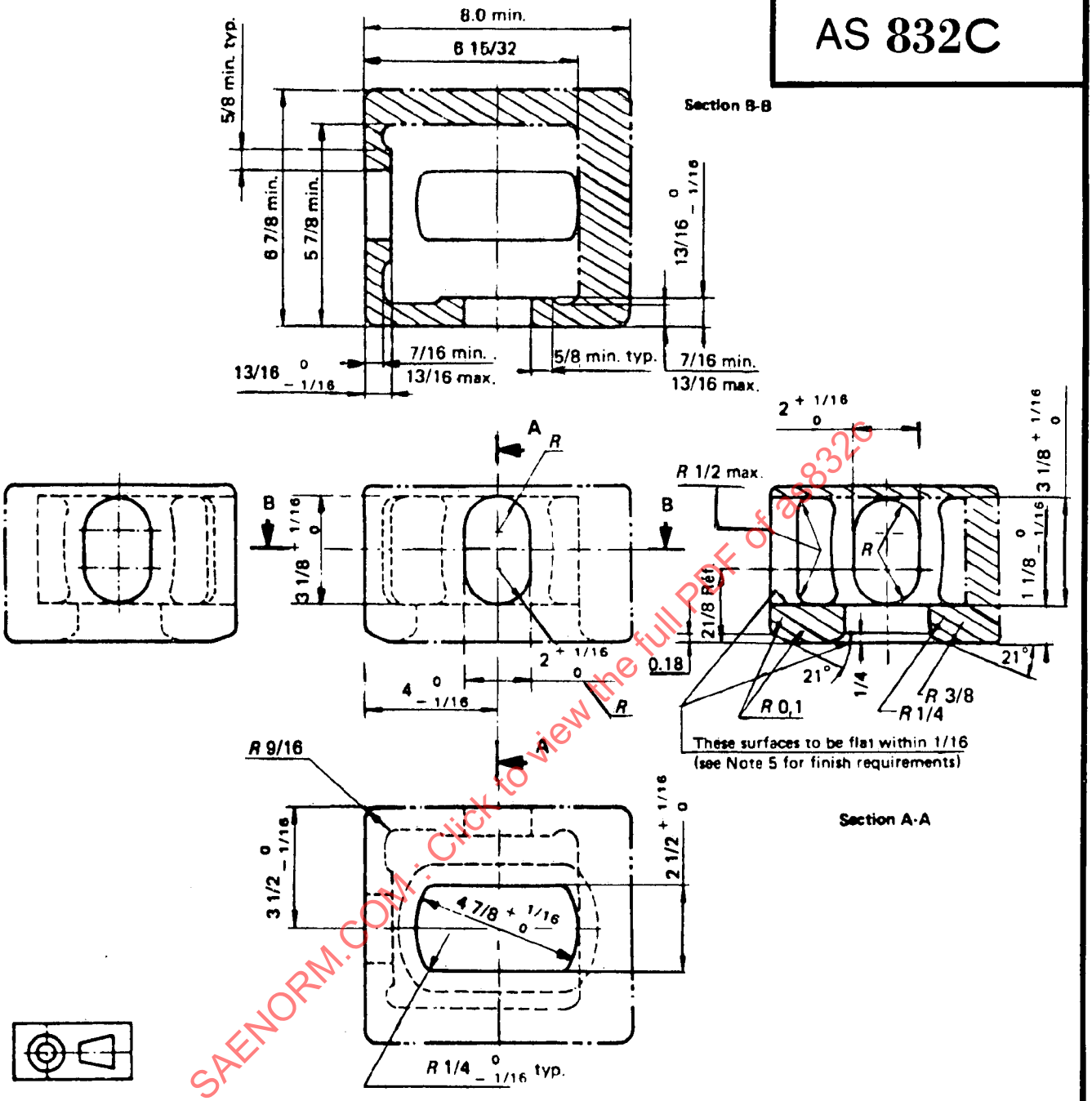
DIMENSIONS IN INCHES
(DIMENSIONS IN MILLIMETERS IN PARENTHESES)

Ø FIGURE-4 (BOTH ENDS)



SECTION **A - A**

SECTION **A - A** OPTIONAL



NOTES

1 Solid and dotted lines (—— and ------) 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.

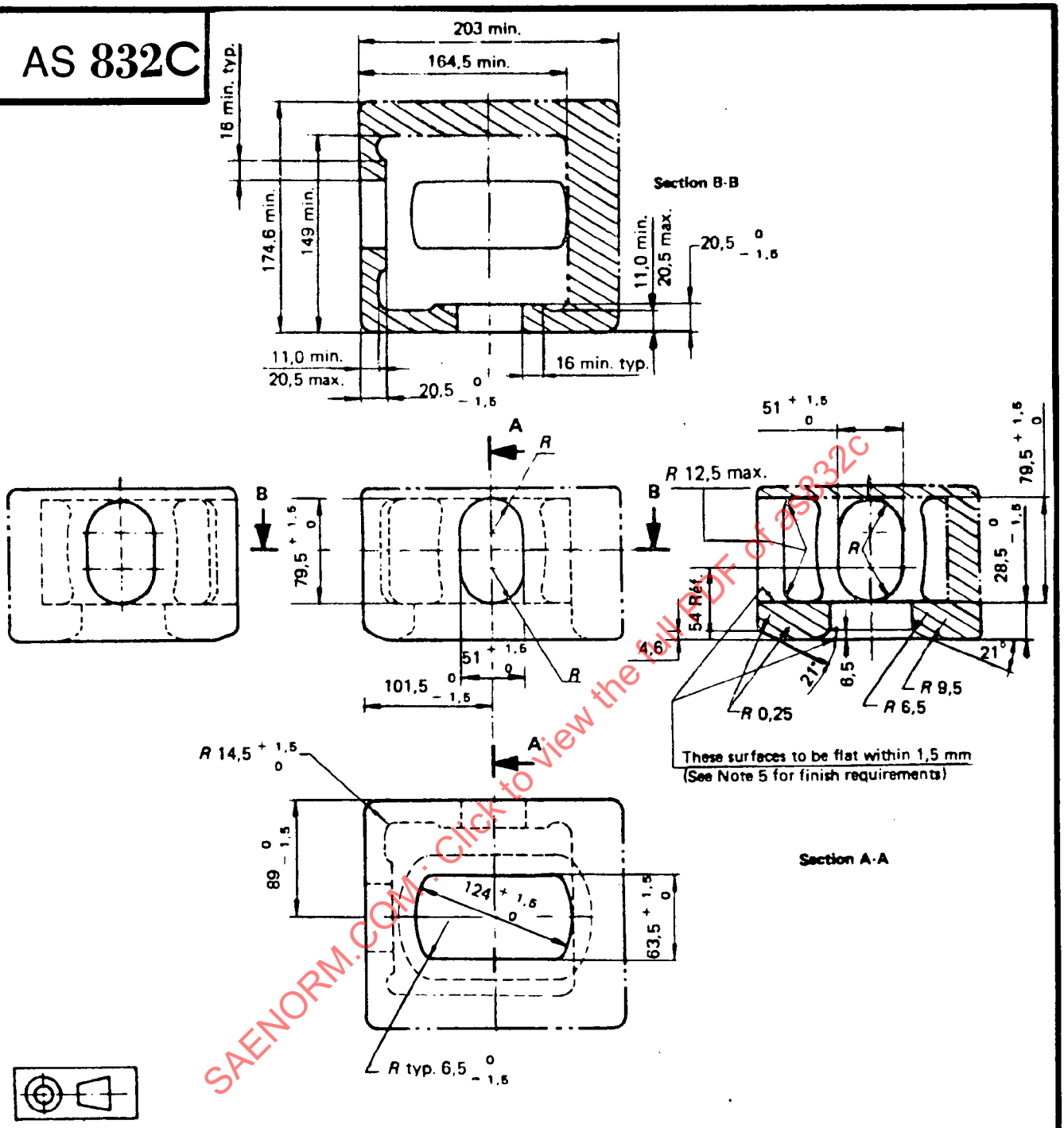
3 Outside and inside corner radii where sharp corners are shown must be 1/8 in. max. except as noted.

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

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

FLUSH MOUNTED BOTTOM CORNER FITTING
DIMENSIONS IN INCHES (See Figure 3C)

FIGURE 5



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1 Solid and dotted lines (—— and ------) 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.

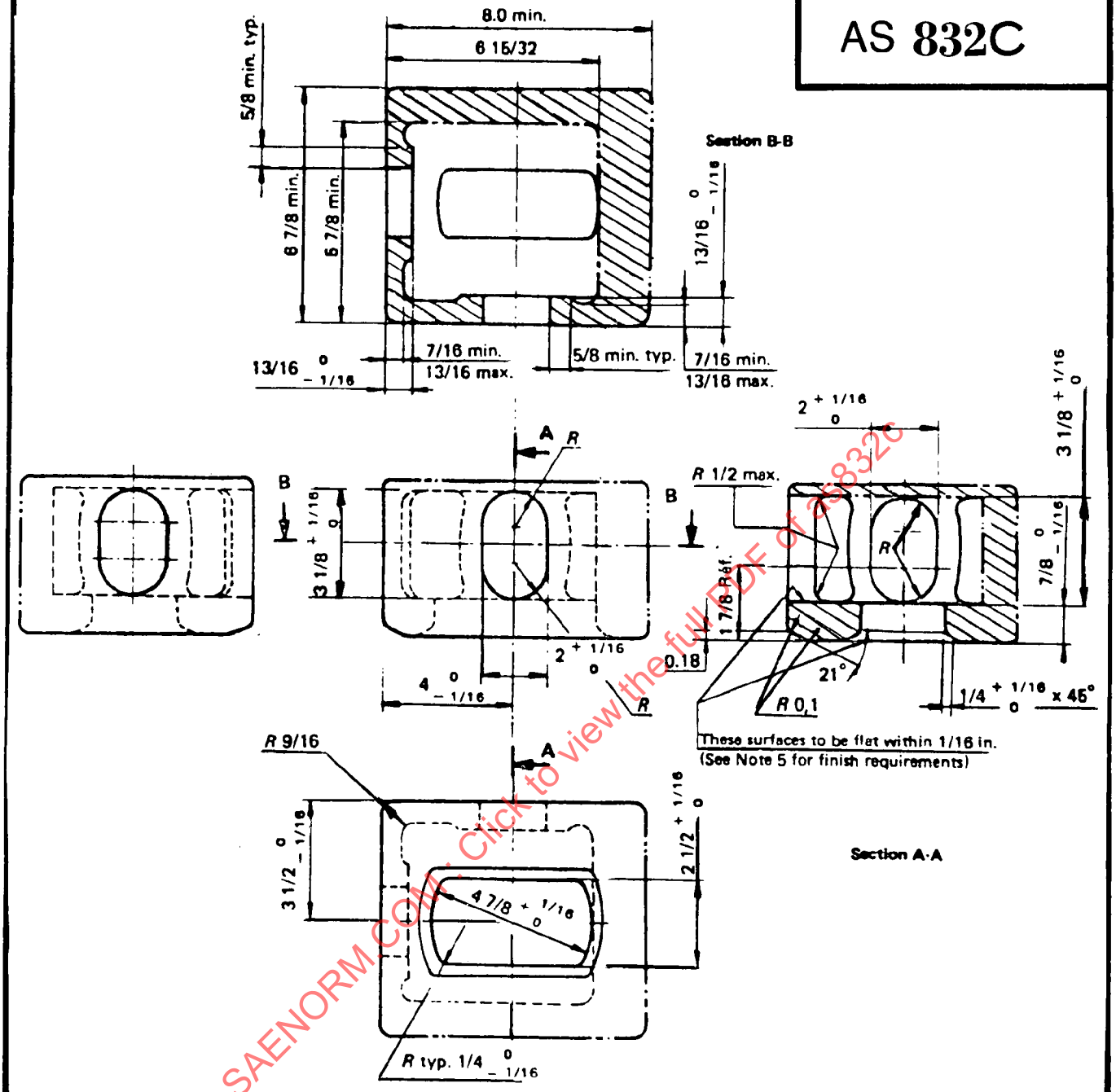
3 Outside and inside corner radii where sharp corners are shown must be 3 mm max. except as noted.

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

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

FLUSH MOUNTED BOTTOM CORNER FITTING
DIMENSIONS IN MILLIMETRES (See Figure 3C)

FIGURE 5 (SI)



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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 container, 2 left hand and 2 right hand.

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

RECESSED BOTTOM CORNER FITTING
DIMENSIONS IN INCHES (See Figure 3B)

FIGURE 5A