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AEROSPACE STANDARD

AS 832

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Revised

AIR-LAND DEMOUNTABLE CARGO CONTAINERS

1. PURPOSE - The purpose of this AS is to provide specifications for air-land demountable cargo containers.

2. SCOPE

2.1 This specification establishes dimensional, structural, and environmental requirements for a series of air-land cargo containers.

2.2 Containers having nominal dimensions of 8 x 8 ft cross section and lengths of 10, 20, 30 and 40 feet are described. Containers are further classified as to handling provisions:

2.2.1 Type I containers are designed for use on conveyor systems only and incorporate no lifting provisions.

2.2.2 Type II containers are designed for use on conveyor systems and provide for additional handling as follows:

2.2.2.1 Type II-A containers have fittings at lower corners to allow handling by crane and sling.

2.2.2.2 Type II-B containers are 10 and 20 foot lengths only which have forklift pockets for handling by forklift truck.

2.2.2.3 Type II-C containers are 10 and 20 foot lengths only which incorporate all handling provisions of Types II-A and II-B.

2.2.2.4 Type II-D containers incorporate all pro-

visions of Type II-C, plus fittings at the four top corners, and are capable of being stacked two high when loaded.

3. REQUIREMENTS

3.1 General - Unless otherwise stated all requirements listed below apply to all types of containers covered by this specification.

3.2 Dimensions - External dimensions and minimum internal volume and door opening of container shall be as specified in Table 1.

3.3 General Body Specification

3.3.1 Body construction shall be rugged, weather-proof or tight, minimizing maintenance and original cost by eliminating unnecessary moving parts such as movable lifting or securing devices, leaving the doors, latches and locks as the only moving parts. All fittings and appurtenances shall be within maximum overall outside dimensions of containers. (Mating devices that support, transfer, position and secure containers shall be provided by transportation carrier, transferring equipment or terminal facilities.) 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.

TABLE 1

Overall Length	Overall Width	Overall Height	Minimum Door Width	Minimum Door Height	Minimum Internal Volume
480 ⁺⁰ / _{-3/8} in.	96 ⁺⁰ / _{-3/16} in.	96 ⁺⁰ / _{-3/16} in.	90 in.	85 in.	2090 cu ft
359-1/4 ⁺⁰ / _{-3/8} in.	96 ⁺⁰ / _{-3/16} in.	96 ⁺⁰ / _{-3/16} in.	90 in.	85 in.	1560 cu ft
238-1/2 ⁺⁰ / _{-1/4} in.	96 ⁺⁰ / _{-3/16} in.	96 ⁺⁰ / _{-3/16} in.	90 in.	85 in.	1040 cu ft
117-3/4 ⁺⁰ / _{-3/16} in.	96 ⁺⁰ / _{-3/16} in.	96 ⁺⁰ / _{-3/16} in.	90 in.	85 in.	490 cu ft

This document supersedes and cancels ARP 832, issued 5/30/64.

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3.3.2 Container shall be capable of traversing a 2 deg crest or valley with no permanent deformation or damage. 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. minimum width with a roller of 1-1/2 in. maximum diameter.

3.3.3 At least 12 sq in. of vent area for each 10 ft length or fraction thereof of container shall be provided.

3.3.4 Type II-D containers shall incorporate fittings at the four top corners conforming to Fig. 1. These fittings shall extend 1/2 in. above the roof surface.

3.4 Container Base

3.4.1 The bottom surface of the floor shall be flat and continuous. No other structure shall protrude below this surface. It shall provide for support and ease of movement of the rated distributed load on minimum conveyor systems described in Paragraphs 3.4.1.1, 3.4.1.2, and 3.4.1.3.

3.4.1.1 Four rows of rollers equally spaced over a minimum width of 76 in. measured between centers with each row composed of 1.5-inch diameter rollers 3 in. long spaced on 10-inch centers. Container must travel perpendicular to roller axes.

3.4.1.2 Swivel casters with 1-inch diameter wheels and contact length of 2 in. located on 12 x 12 in. grid pattern. Container must travel in any direction.

3.4.1.3 Ball transfer units with 1-inch diameter balls located on 5 x 5 in. grid pattern. Container must travel in any direction.

3.4.2 Restraint provisions as shown in Fig. 2, 3 and 4 shall be provided on all containers.

3.4.3 Type II-A, II-C, and II-D containers shall incorporate fittings at the four lower corners conforming to Fig. 5.

3.4.4 Type II-B, II-C, and II-D containers shall incorporate forklift tineways located as shown in Fig. 6.

3.4.5 The lower edges of the base shall have a .38 in. minimum radius or equivalent relief.

3.5 Design Loads

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

- (a) 10 ft container - 12,500 lb
- (b) 20 ft container - 25,000 lb
- (c) 30 ft container - 35,000 lb
- (d) 40 ft container - 45,000 lb

Containers over 10 ft in length shall be designed for a gross weight of 14,900 lb in any ten-foot section of the container.

3.5.2 While supported on a roller system in accordance with Paragraph 3.4.1.1, the container loaded to its gross weight shall withstand the following load factors with the cargo's center of gravity located at any point in the range specified:

3.5.2.1 Design Loads

The container shall be designed to the following operational load factors:

Forward	1
Aft	1
Up	1
Down	3
Side	1

Under these conditions the container shall exhibit no permanent deformation.

The container shall be designed for the following ultimate load factors based on its gross weight.

Forward	1-1/2
Aft	1-1/2
Up	2-1/2
Down	5
Side	1-1/2

Under ultimate load conditions the container may exhibit permanent deformation but will not rupture to the extent of discharging cargo.

All loads are mutually exclusive except that a lg down load may be considered to act concurrently with the forward, aft, and side loads.

3.5.2.1.1 Side loads shall be reacted at the container base.

3.5.2.1.2 Vertical, fore, and aft loads shall be reacted by a minimum fitting as shown in Fig. 7 inserted in the restraint slots. The design shall allow the fore and aft loads to be reacted by the following number of load bearing slots:

10 ft container	- 2 slots
20 ft container	- 5 slots
30 ft container	- 8 slots
40 ft container	- 11 slots

The ultimate fore and aft load for any slot shall be 18,750 lb. The load bearing slots shall be considered to be either on one or both sides of the container.

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

3.5.2.1.3 End restraint slots shall be designed to restrain a 10-foot container for ultimate forward, aft and vertical up loads when used in conjunction with restraint fittings in accordance with Fig. 8.

3.5.2.2 Center of gravity shall be assumed to vary:

- 1) Plus and minus 10% of internal width measured from geometric center of enclosed space.
- 2) Plus and minus 5% of internal length measured from geometric center of enclosed space.
- 3) From 12 in. above upper surface of floor to mid-way between upper surface of floor and underside of roof.
- 4) To achieve above asymmetric conditions, cargo density shall be assumed to vary linearly.

3.5.3 The container roof shall support without permanent deformation 600 lb applied to any 12 x 24 in. area acting down.

3.5.4 The container shall withstand without permanent deformation a forklift wheel load of 6,000 lbs on each of two wheels on 30-inch centers anywhere inside and 9,000 lbs per wheel within 1.5 ft of the door while resting on a surface of sufficient strength and continuity to adequately support the container floor. (Wheel footprint is assumed to be 22 sq in. with a width of 7 in.).

3.5.5 Type II-A, II-C, and II-D containers shall be capable of withstanding without permanent deformation a uniformly distributed load equal to twice gross weight while supported by slings or frames connected to the four lower corner fittings. Type II-D containers shall have the same capability while supported from four top corner fittings.

3.5.6 Type II-D containers shall be capable of statically supporting a down load of twice their gross weight equally divided among and through the horizontal faces of the four top corner fittings.

3.5.7 Type II-B, II-C, and II-D containers shall be capable of withstanding, without permanent deformation, a uniformly distributed load equal to twice gross weight while supported by a forklift truck.

3.5.8 While supported on a roller system in accordance with Paragraph 3.4.1.1, the container floor shall withstand 400 lb per sq. ft. using operational load factors per Paragraph 3.5.2.1.

3.6 Environmental Criteria

3.6.1 The container shall be designed and built using materials which will provide maximum serviceability under intended environmental conditions.

3.6.2 The structural and operational integrity of the container shall be maintained in a temperature environment from -65 F to 160 F.

3.6.3 The container shall be weather resistant and capable of protecting the cargo.

3.6.4 The container shall be corrosion resistant in normal operating environment.

3.6.5 The container shall employ devices permitting air to flow in or out for pressure equalization.

3.7 Internal Securing Provisions - There shall be incorporated provisions for "D" rings or an equivalent, each capable of reacting a 4,000 lb operating load applied in any direction, spaced at approximately 24-inch centers around the internal periphery of the container base.

4. TESTING REQUIREMENTS

4.1 Scope

4.1.1 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.

4.1.2 It is intended that tests shall be nondestructive in nature and not result in damage to the container unless

ultimate load conditions are employed.

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

4.2 Load Factors - Unless otherwise required, operational load factors are employed in all tests.

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 that exhibit permanent deformation are replaced.

4.3 Test Criteria

4.3.1 A container shall be considered satisfactory if, upon inspection before and after testing, its dimensions fall within those specified in Table 1 and in applicable manufacturing drawings.

4.3.2 When tests are repeated under ultimate load conditions, a container shall be considered within acceptable structural limits if it exhibits permanent deformation but does not rupture to the extent of discharging cargo.

4.3.3 Test instrument calibration shall be traceable to limits established by the National Bureau of Standards.

4.4 Recommended Test Equipment

4.4.1 Handling and Securing

4.4.1.1 When restraint or movement on an aircraft system is used, the test system shall be in accordance with Paragraph 3.4.1.1. 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.

4.4.1.2 A crane or lifting means with capacity to lift twice the gross weight of the loaded container shall be provided. Sufficient height shall exist under the hook to permit positioning the container vertically on either side or end.

4.4.1.3 Bridle chains, cable or spreaders with capacity to lift the loaded container at the four upper or lower corners with appropriate capacity hooks or shackles shall be provided.

4.4.2 Structural

4.4.2.1 Sufficient payload to meet test load requirements shall be provided. Where appropriate, water or load producing devices may be used.

4.4.2.2 An industrial truck or equivalent equipment capable of a maximum load of 12,000 lb on one axle with a minimum wheel width of 7 in. and a maximum footprint area of 22 sq in. per wheel on 30-inch wheel centers shall be provided.

4.4.2.3 An industrial truck or equivalent equipment capable of lifting 10 or 20 foot containers loaded to twice their gross weight shall be provided.

4.5 Test Procedure - Prototype Container

4.5.1 Test #1 - Lifting and Stacking

4.5.1.1 Type II-A, II-C and II-D 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 45 deg to the horizontal. After lifting, the container shall be suspended for not less than five minutes and then lowered to the ground. Permanent deformation shall not occur. Repeat on Type II-D containers, lifting from top corner fittings.

4.5.1.2 Type II-B, II-C and II-D containers shall be loaded to twice gross weight and lifted clear of the ground by using a forklift truck of suitable capacity. After lifting, the container shall be suspended for not less than five minutes and then lowered to the ground. Permanent deformation shall not occur.

4.5.1.3 Type II-D 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.

4.5.2 Test #2 - End Panel Strength and Longitudinal Restraint.

4.5.2.1 The container under test shall be latched to the aircraft system or its equivalent. The number of latches shown in Paragraph 3.5.2.1.2 shall be engaged on one side and adjusted by suitable means to assure contact with the end of the latch receptacle slot. A longitudinal force equal to the gross weight shall be evenly distributed over one end panel. No permanent deformation or failure shall occur. Should their structure not be identical, both ends shall be tested for restraint and panel load in the same manner.

Repeat 4.5.2.1 for 10 ft containers using only restraints in fore and aft slots in accordance with Fig. 8.

4.5.2.2 Type II-A, II-C and II-D containers shall have 4.5.2.1 repeated with the container secured to mating fittings used on USASI container ground handling equipment on chassis and rail cars.

4.5.3 Test #3 - Side Panel Strength and Lateral Restraint.

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. A lateral force equal to maximum payload shall be applied uniformly over the inner surface of the side panel. Should their structure not be identical, both sides shall be tested. No permanent deformation or damage shall occur. The deflection at the intersection of the top and side panel shall not exceed 1.5 inches.

4.5.4 Test #4 - Roof Panel Strength and Vertical Restraint.

4.5.4.1 The container shall be suspended upside down from the aircraft loading system or its equivalent. 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. The container shall have a load equal to the gross weight uniformly distributed over the inside of the roof. No permanent deformation or damage shall occur.

This test shall be repeated for 10 ft containers using only restraint in accordance with Fig. 8.

4.5.4.2 A uniformly distributed load of 600 lb acting down on the top of the container shall be applied to a 12 x 24 in. area in the center of the roof. No permanent deformation shall occur.

4.5.5 Test #5 - Floor Strength

4.5.5.1 Type I, II-A, II-B, II-C and II-D containers shall have the base resting on a surface of sufficient strength and continuity to adequately support the container floor. An industrial truck loaded to an axle weight of not less than 12,000 lb (including the weight of the truck) or 6,000 lb per wheel (applied to a contact area not greater than 22 sq in., assuming a wheel width of not less than 7 in. and wheel centers of 30 in.) shall then be maneuvered over the entire floor of the container to load the container to maximum gross weight. An industrial truck loaded to 9,000 lb per wheel shall then be maneuvered over the area extending 1.5 ft inside door.

4.5.5.2 While retained on the aircraft loading system or its equivalent, the floor shall be uniformly loaded to 1,200 lbs per sq ft. The load shall be applied to an area 5 ft wide centered in the container and the load shall equal but not exceed 3 times maximum payload.

4.5.5.3 The container shall be uniformly loaded to gross weight and cycled one hundred times over a substantially level section of the aircraft system or equivalent at a minimum speed of 60 ft per minute. Each cycle shall be equal to twice container length. At test speed draw bar pull shall be recorded during the first and last cycle. Maximum allowable draw bar pull shall be 3% of gross weight. Maximum variation of draw bar pull from the first to the last cycle shall not exceed 0.5% of gross weight.

4.5.5.4 When the container is loaded to gross weight and retained on the aircraft system or equivalent, the doors shall be fully opened and closed for three complete cycles. The doors shall open and close with no prevalent binding and the locks shall engage and disengage with ease.

4.5.5.5 Cargo tie down rings shall be tested by applying a 4,000 lb tension load at 45 deg to horizontal and vertical planes passing through the ring attachment.

4.5.6 Test #6 - Resistance to Racking - The container shall be loaded to gross weight. It shall be restrained along one side against movement sideways. 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 be-

tween the bottom of the container and the aircraft system on the side opposite to that which is restrained against sideways movement. The container shall be considered satisfactory if no permanent deformation results from the above loading.

4.5.7 Test #7 - Watertightness - All exterior surfaces of the walls, roof and floor of the container shall be simultaneously sprayed for 15 minutes with jets of water under a pressure of not less than 15 lb per sq in. gage. A sufficient number of jets shall be placed 5 ft from the container to insure complete spray coverage of all surfaces at an impingement rate corresponding to 2 in. of rain per hour. At the conclusion of the test if the interior is free from visible moisture, the container shall be considered satisfactory.

4.5.8 Test #8 - Corrosion - Subject any parts not adequately protected against corrosion to a test per Mil. Std. 810B. Subsequent corrosion shall not preclude the parts from performing their design functions or incur failure of container.

4.5.9 Test #9 - Ambient Temperature - The closed container shall be placed empty in a suitable test chamber at 160 F ambient temperature for 48 hours. At the end of this time, its condition shall be evaluated while the structure is at or near the test temperature. Doors must be operable with seals intact.

The closed container shall then be placed empty in a suitable test chamber in a -65 F ambient temperature for 48 hours. At the end of this time, its condition shall be evaluated while the structure is at or near the test temperature. Doors must be operable with seals intact.

4.6 Test Procedure - Production Containers - To show compliance with this 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 can not be clearly established, the first product so changed shall be retested to show compliance with this specification.

5. SEALING

5.1 General - In order to prevent tampering or pilferage of shipments moving under customs control, a sealing system shall be used and will be positioned so that a sealing unit will be held firmly in place when the seal is affixed.

5.2 Construction Specifications

5.2.1 Doors and all other closing systems of containers shall be fitted with a device which shall permit simple and effective customs sealing. This device shall either be welded to the sides of doors where these are of metal, or secured by at least two bolts, riveted or welded to the nuts on the inside.

5.2.2 Hinges shall be so made and fitted that doors and other closing systems 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. These requirements shall be waived, however, where the doors and other closing systems have a locking device inaccessible from the outside which, once applied, prevents the doors from being lifted off the hinge-pins.

5.2.3 Doors shall be so constructed as to cover all interstices and ensure complete and effective closure. The various parts shall fit each other exactly and be so arranged that it is impossible either to move or remove them without leaving visible traces of entry or damaging the customs seal.

5.2.4 The container shall be provided with a satisfactory device for protecting the customs seal, or shall be so constructed that the customs seal is adequately protected.

5.2.5 Pressure equalization devices shall be constructed so as to prevent access to the commodities when a container is moving under customs control.

5.2.6 Containers shall be constructed so as to be free of any recesses or voids in which cargo or other material can be concealed.

5.3 Agricultural Quarantine Requirements - Exterior and interior surfaces should be as free as possible of recesses, railings and protuberances where pests can hide or soil or other residues can accumulate.

6. MARKING REQUIREMENTS

6.1 All containers covered by this specification shall be marked in accordance with the following minimum requirements. The markings shall be shown on the top left hand corner on all four sides of the container and in such a manner that good readability is ensured under all phases of handling. The first two lines (Reg. Nr. and ID Code) shall be in letters not less than 4 in. high and all other lettering not less than 1 in. high.

Reg. Nr.	(IATA*/ATA)	(Country of Ownership)
ID Code:	(Owner Name and Serial No.)	
Actual Wt. Tare	Kgs/	Lbs.
Max. Gross Wt.	Kgs/	Lbs.
Ext. Vol.	(3 decimal points) Cu. M.	(2 decimal points) Cu. Ft.
Certification(s)	(Authority)	

NOTES: (i) The IATA registration describes the type and size of the container, and for member airline owned equipment includes two letter carrier abbreviations.

(ii) All weights to be rounded off to the next highest 1/2 kilogram of full pound.

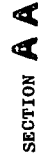
(iii) Certification shall be indicated by listing this specification number (AS 832) and other standards under which the container has been approved.

6.2 The following additional manufacturer's markings shall be indicated on the container. The positioning of such markings is optional and the letter size should be approximately 1/4 in. high.

Manufacturer _____	(Name)	(Country)
Part No. _____		
Ser. No. _____		
Date Mfd. _____		
(Month and Year)		

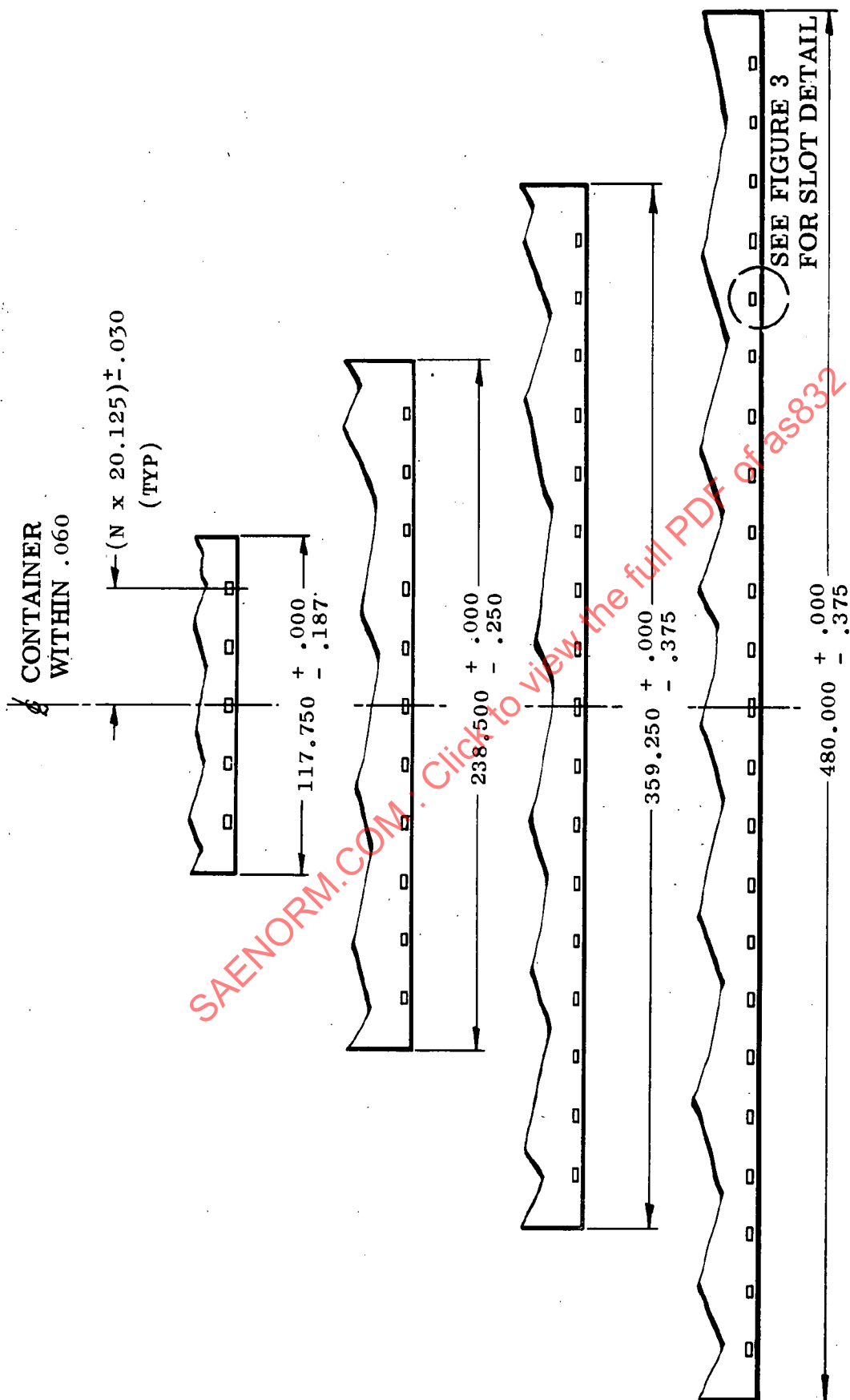
NOTE: The manufacturer's serial number is optional.

7. CARRIAGE OF DOCUMENTS - Provision shall be made for a weatherproof pocket for the carriage of documents.

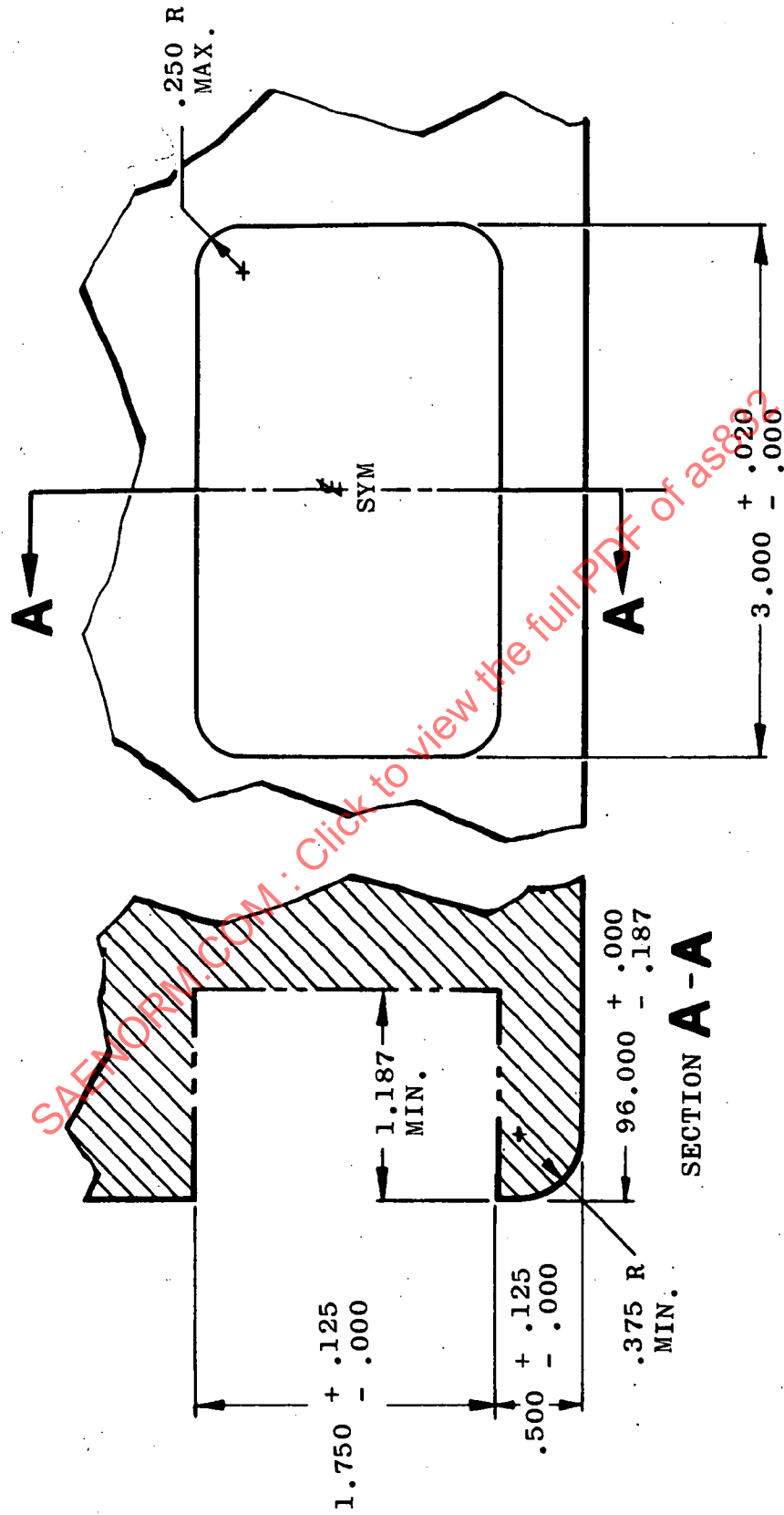


TOP CORNER FITTING
FIGURE 1

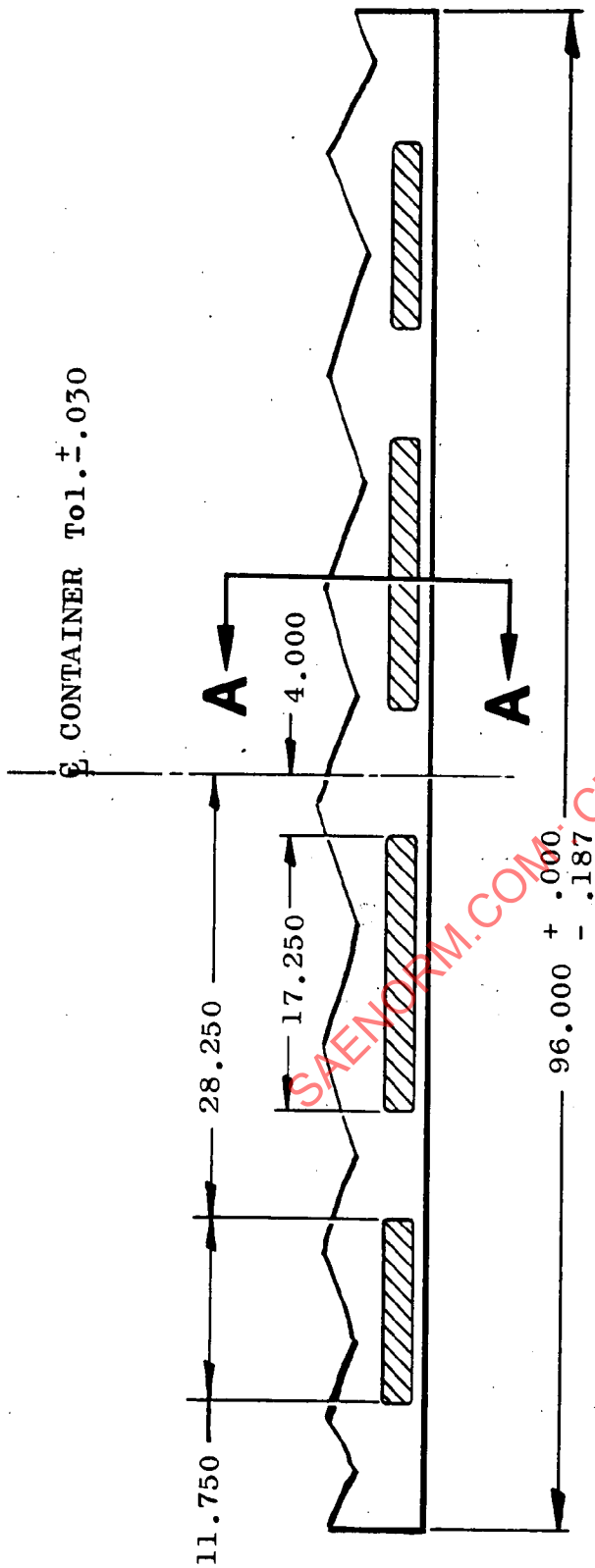
- NOTES
1. SOLID AND DOTTED LINES (-----) SHOW SURFACES AND CONTOURS, WHICH MUST BE PHYSICALLY DUPLICATED IN THE FITTING.
 2. PHANTOM LINES (-----) SHOW OPTIONAL WALLS, WHICH MAY BE USED TO DEVELOP A BOXED SHAPED FITTING.
 3. OUTSIDE AND INSIDE CORNER RADII, WHERE SHARP CORNERS ARE SHOWN MUST BE $\frac{1}{8}$ IN. MAXIMUM EXCEPT AS NOTED.
 4. FOUR FITTINGS REQUIRED PER CONTAINER, 2 R.H. - 2 L.H.



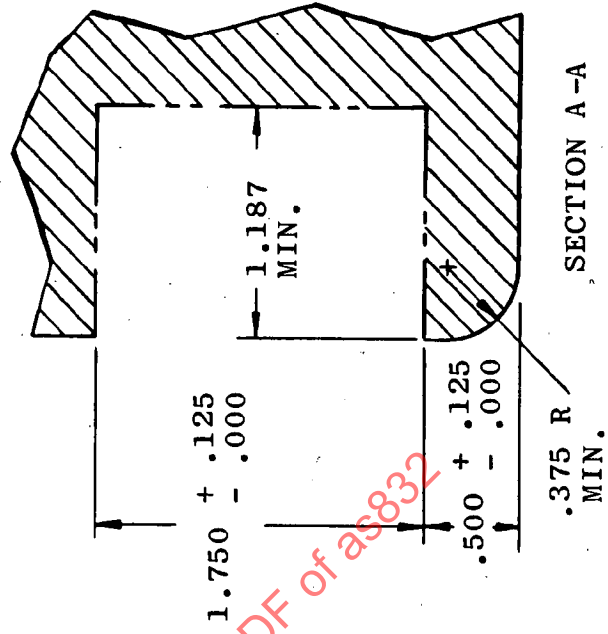
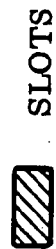
SIDE RESTRAINT SLOTS LOCATION
FIGURE 2



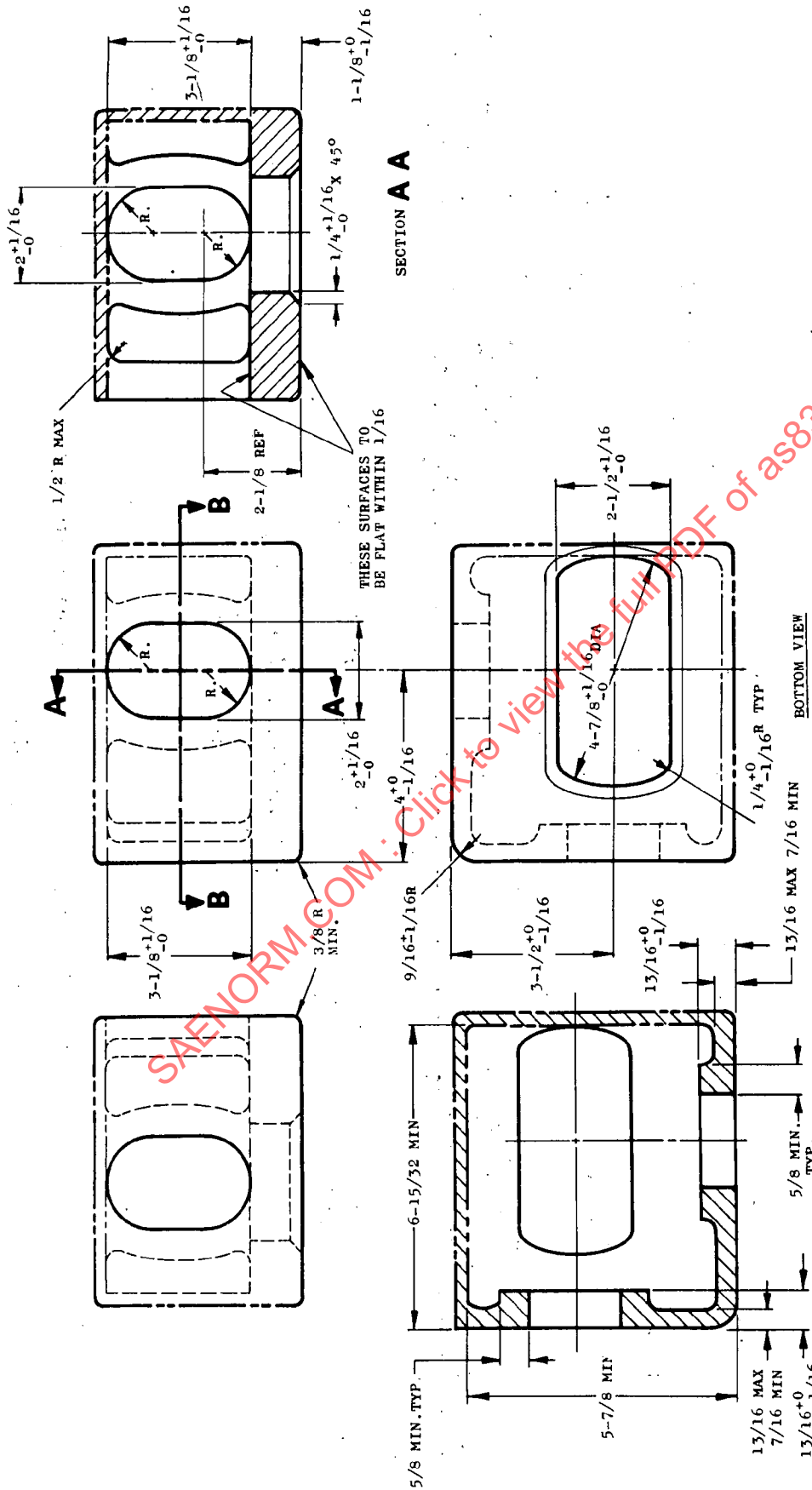
SIDE SLOT DETAIL
FIGURE 3



TOL. $\pm .030$ UNLESS OTHERWISE NOTED



END SLOTS
FIGURE 4



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 CONTAINER 2 L.H. AND 2 R.H.

BOTTOM CORNER FITTING
FIGURE 5