

**TECHNICAL SPECIFICATION**

**FOR**

**2438mm x 2200mm x 2260mm**

**STEEL DRY CARGO CONTAINER**

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## 1. General

### 1.1 Scope

This specification will cover the design, construction, materials, testing and inspection performances of 2438 x 2200 x 2260 type end door steel dry cargo containers.

These containers specified herein will be manufactured at \_\_\_\_\_ under strict quality control by \_\_\_\_\_ and be approved by the classification society or agency.

### 1.2 Operational environment

The container will be designed and constructed for carriage of general cargo by marine, road and rail throughout the world. All materials used in the construction will be to withstand extremes of temperature range from -40°C (-40°F) to +70°C (+158°F) without effect on the strength of the basic structure and watertightness.

### 1.3 Standards and Regulations

The container will satisfy the following requirements and regulations, unless otherwise mentioned in this specification.

#### 1.3.1 ISO Container Standards

ISO 668	-- Series 1 freight containers - Classification external dimensions and ratings
ISO 830	-- Terminology in relation to freight container
ISO 1161	-- Series 1 freight containers - Corner fittings Specification
ISO 1496-1	-- Series 1 freight containers - Specification and testing. part 1: General cargo containers for general purposes
ISO 1894	-- General purpose series 1 freight containers - Minimum internal dimensions
ISO 6346	-- Freight containers - coding, identification and marking

#### 1.3.2 T.I.R. Certification

All the containers will be certified and comply with "The Customs Convention on the International Transport of Goods under the cover of T.I.R. Carnets." or "The Customs Convention on Containers."

#### 1.3.3 C.S.C. Certification

All the containers will be certified and comply with the requirements of the "International Convention for the Safe Containers."

#### 1.3.4 T.C.T. Certification

All exposed wooden components used for container will be treated to comply with the requirements of "Cargo Containers - Quarantine Aspects and Procedures" of the Commonwealth Department of Health, Australia.

### 1.3.5 Classification society

All the containers will be certified for design type and individually inspected by classification society, **BV, ABS, LR, GL** or **CCS**.

* Note:	BV	:	Bureau Veritas ( <i>France</i> )
	ABS	:	American Bureau of Shipping ( <i>USA</i> )
	LR	:	Lloyd's Register of Shipping ( <i>UK</i> )
	GL	:	Germanischer Lloyd ( <i>Germany</i> )
	CCS	:	China Classification Society ( <i>P.R.C</i> )

### 1.4 Handling

The container will be constructed to be capable of being handled without any permanent deformation under the following conditions:

- a) Lifting, full or empty, at top corner fittings using slings with terminal fittings at any angles between vertical and 60 degrees to the horizontal.
- b) Lifting, full or empty, at bottom corner fittings using slings with terminal fittings at any angles between vertical and 60 degrees to the horizontal.
- c) Lifting, full or empty, at forklift pockets using forklift truck.

### 1.5 Transportation

The container will be constructed to be suitable for transportation in the following modes:

- a) Marine : In the ship cell guides of vessels, four (6) high stacked.  
On the deck of vessels, four (4) high stacked and secured by vertical and diagonal wire lashings.
- b) Road : On flat bed or skeletal chassis, secured by twistlocks or equivalent at the bottom corner fittings.
- c) Rail : On flat cars or special container cars secured by twistlocks or equivalent at the bottom corner fittings.

## 2. Dimensions and Ratings

### 2.1 External Dimensions

Length	2,438	+ 0mm	- 5mm
Width	2,200	+ 0mm	- 5mm
Height	2,260	+ 0mm	- 5mm

- 1) No part of the container will protrude beyond the external dimensions mentioned above.
- 2) Maximum allowable differences between two diagonals on anyone of the following surfaces will be as follows:  
Roof, bottom, side, front and rear diagonals: 10mm

### 2.2 Internal Dimensions

Length	2,278	+ 0mm	- 5mm
Width	2,112	+ 0mm	- 5mm
Height	2,059	+ 0mm	- 5mm

### 2.3 Door opening dimensions

Width	2,100	+ 0mm	- 5mm
Height	1,949	+ 0mm	- 5mm

### 2.4 Internal cubic capacity (Nominal)

9.906 cu.m      350 cu.ft

### 2.5 Forklift pockets

Width	302 mm
Height min.	102 mm
Centre to centre	820 mm +/- 50 mm

### 2.6 Ratings

Max. Gross Weight (R)	6,000 kg	13,230 lb
Tare Weight (design) (T)	950 kg	2,100 lb
Max. Payload (P)	5,050 kg	11,130 lb

Tare Weight Tolerance 2%

### 3. Materials

#### 3.1 General

The following materials will be used in the construction of containers.

#### 3.2 Part specification

	<u>Parts</u>	<u>Materials by JIS</u>
1)	Roof panels Door panels Side panels Door sill Cross members Bottom side rails Door header (upper & lower) Floor center rail Top side rails Door horizontal frames Door vertical frames Corner posts (inner & outer) Upper and lower plates of forklift pockets	Anti-Corrosive Steel: CORTEN A, SPA-H, B480 or equivalent Y.P. : 35 kg/sq.mm T.S. : 49 kg/sq.mm
2)	Door locking bars	Structural steel round pipe. STK41 Y.P. : 24 kg/sq.mm T.S. : 41 kg/sq.mm
3)	Corner Fitting	Casted weldable steel. SCW480 Y.P. : 28 kg/sq.mm T.S. : 49 kg/sq.mm
4)	Locking gear cams and keepers	Forged weldable steel. S20C Y.P. : 23 kg/sq.mm T.S. : 44 kg/sq.mm
5)	Door hinge pins Door gasket retainer	Stainless steel. SUS304
6)	Door gasket	EPDM
7)	Floor board	Hardwood plywood, 19-ply
8)	Ventilator	ABS resin labyrinth type

\* Note: Y.P. --- Yielding Point  
T.S. --- Tensile Strength

## **4. Construction**

### **4.1 General**

- 4.1.1 The container will be constructed with steel frames, fully vertical-corrugated steel sides , front panels horizontal-corrugated steel double doors at rear end, flat steel roof and corner fittings.
- 4.1.2 All welds of exterior including the base frames will be continuous welding using CO<sub>2</sub> gas shielding procedure, but inner part of each bottom side rail will be fastened by staggered stitch welding.
- 4.1.3 Interior welds - when needed - will be stitched with a minimum bead length of 15mm.
- 4.1.4 Gaps between adjacent components to be welded will not exceed 3mm or the half thickness of the parts being welded.
- 4.1.5 Chloroprene sealant is to be applied at periphery of floor surface and inside unwelded seams, butyl sealant is used to caulk at invisible seam of floor joint area and between door gasket and frame.
- 4.1.6 The wooden floor will be fixed to the base frames by zinc plated self-tapping screws.

### **4.2 Protrusion**

- 4.2.1 The plane formed by the lower faces of the bottom side rails and all transverse members shall be positioned by 12.5mm +5/-1.5mm above the plane formed by the lower faces of the bottom corner fittings.
- 4.2.2 The top corner fittings are to protrude a minimum of 6mm above the highest point of the roof.
- 4.2.3 The outside faces of the corner fittings will protrude from the outside faces of the corner posts by minimum 4mm for side structure.
- 4.2.4 The outside faces of the corner fittings will protrude from side wall by nominal 8mm.
- 4.2.5 Under maximum payload, no part of the container will protrude below the plane formed by the lower faces of the bottom corner fittings at the time of maximum deflection.
- 4.2.6 Under 1.8 x maximum gross weight, no part of the container will protrude more than 6.0mm below the plane formed by the lower faces of the bottom corner fittings at the time of maximum deflection.

### **4.3 Corner fittings**

The corner fittings will be designed in accordance with ISO 1161 (Amd. 1990) and manufactured at the works approved by classification society.

### **4.4 Base frame structure**

Base frame will be composed of two (2) bottom side rails, a set of forklift pockets and totally seven (7) cross members.

#### 4.4.1 Bottom side rail

Each bottom side rail is built of 50x158x30x4.0mm cold-formed channel section steel made in one piece. The floor guide rails of 3.0mm thick pressed angle section steel are provided to the bottom side rails by staggered stitch welding.

The lower flange of the bottom side rail is outward so as to facilitate easy removal of the cross members during repair and of less susceptible corrosion.

Reinforcement plates to be made of 4.0mm thick, flat steel plates. The plates are welded to bottom corner fitting.

#### 4.4.2 Forklift pockets

Each forklift pocket is built of 3.0mm thick cold-formed channel section steel made in one piece and two 200 mm deep x 6.0 mm thick flat lower end plates.

#### 4.4.3 Cross member

The cross members are made of pressed channel section steel with a dimension of 45x122x45x3.0mm for the normal areas for the floor butt joints. The cross members are placed fully to withstand floor strength and welded to each bottom side rail.

#### 4.5 Flooring

The floor will consist of two pieces plywood boards, one floor centre rail, and self-tapping screws.

##### 4.5.1 Floor

The wooden floor to be constructed with 28mm thick 19-ply hardwood plywood boards are laid longitudinally on the transverse members between the 3.0mm thick pressed hat section steel floor centre rail and the 3.0mm thick pressed angle section steel floor guide rails stitched welded to the bottom side rails.

The floorboards are tightly secured to each transverse member by self-tapping screws, and all butt joint areas and peripheries of the floorboards are caulked with sealant.

- 1) Wood species : Apitong or Keruing
- 2) Glue : Phenol-formaldehyde resin.
- 3) Treatment :
  - a) Preservative: Basileum or others.
  - b) In accordance with Australian Health Department Regulations, Average moisture content will be 12% before installation.

##### 4.5.2 Self-tapping screw

Each floor board is fixed to the transverse members by zinc plated self-tapping screws that are 8.0mm dia. shank x 16mm dia. head x 45mm length, and fastened by five screws per cross member. Screw heads are to be countersunk with about 2mm below the floor top surface.

#### 4.6 Door end frame structure

The door end frame will be composed of one door sill, two corner posts, one door header and four corner fittings, which will be welded together to make the door-way.

#### 4.6.1 Door sill

The door sill is made of a 4.0mm thick pressed open section steel and the upper face of the door sill has a 10mm slope for better drainage.

#### 4.6.2 Rear corner post

Each rear corner post of hollow section is fabricated with 4.5mm thick pressed steel outer part and 41.5x121x4.0mm thick pressed channel section steel inner part, which are continuously welded together to ensure a maximum width of the door opening and to give a sufficient strength against stacking and racking forces.

Three (3) sets of hinge pin lugs are welded to each rear corner post.

#### 4.6.3 Door header

The door header is constructed with a 4.0mm thick pressed "U" section steel lower part having four internal gussets at the back of each locking cam keeper location and a 3.0mm thick pressed steel upper part, which are formed into box section by continuous welding.

#### 4.7 Door

4.7.1 Each container will have double wing doors at end frame, and each door will be capable of swinging approximately 270 degrees.

4.7.2 Each door is constructed with two 3.0mm thick pressed channel section steel horizontal frames for the top and bottom, 100x50x2.3mm thick rectangular hollow section vertical frames for the post side and centre side of door respectively, 1.6mm thick horizontally corrugated steel door panel, which are continuously welded within frames.

Additionally, one locking box to be welded to door at centre vertical frames.

4.7.3 Two sets of galvanized locking assemblies which one is the same model with "BE2566M" steel handles are fitted to each door wing using high tensile zinc plated steel bolts according to TIR requirements. Locking bar retainers are fitted with nylon bushings at the top, bottom and intermediate bracket.

Locking gears should be assembled after painting and not to be painted.

4.7.4 The left-hand door can not be opened without opening the right hand door when the container is sealed in accordance with TIR requirements.

4.7.5 The door hold-back of nylon rope is provided to the centre locking bar on each door and a hook of steel bar is welded to each bottom side rail.

4.7.6 Each door is suspended by three hinges being provided with stainless steel pins, self-lubricating nylon bushings and brass washers, which are placed at the hinge lugs of the rear corner posts.

4.7.7 The door gasket made of extruded triple lip type (J-C type - vertical and upper are "J", lower is "C") EPDM rubber that is installed to the door peripheral frames with stainless steel gasket retainers and fastened by stainless steel blind rivets at a pitch of 150mm. The door gasket must be caulked with butyl sealant before installation to the door frame.



#### 4.8 Roof structure

The roof will be constructed with flat steel panels and four corner protection plates.

##### 4.8.1 Roof panel

The roof will be constructed with 1.6mm thick flat steel panels reinforced by 1.6mm thick 'hat' shape section channels, which are welded together to form one whole and continuously welded to the top side rails and top end rails. All overlapped joints of inside unwelded seams are caulked with chloroprene sealant.

##### 4.8.2 Protection plate

Each corner of the roof in the vicinity of top corner fitting is reinforced by 3.0mm thick rectangular steel plate to prevent the damage caused by mishandling of lifting equipment.

#### 4.9 Top side rail

Each top side rail is made of a 60x60x2.3mm thick square hollow section steel.

#### 4.10 Side wall

The trapezium section side wall is constructed with 1.6mm thick fully vertically continuous-corrugated steel panels which are butt welded together to form one panel and continuously welded to the side rails and corner posts. All overlapped joints of inside are caulked with chloroprene sealant.

#### 4.11 Front structure

Front end structure will be composed of one bottom end rail, two corner posts, one top end rail, four corner fittings and an end wall, which are welded together.

##### 4.11.1 Bottom end rail

The bottom end rail is made of a 3.0mm thick pressed open section steel.

##### 4.11.2 Front corner post

Each corner post is made of 4.0mm thick pressed open section steel in a single piece, and designed to give a sufficient strength against stacking and racking forces.

##### 4.11.3 Top end rail

The top end rail is constructed with 60x60x2.3mm thick square hollow section steel at lower part and 3.0mm thick pressed steel at upper part.

##### 4.11.4 Front wall

The trapezium section front wall is constructed with 1.6mm thick vertically corrugated steel panels, butt welded together to form one panel, and continuously welded to front end rails and corner posts. All overlapped joints of inside are caulked with chloroprene sealant.

#### 4.12 Special feature

##### 4.12.1 Customs seal provisions

Customs seal and padlock provisions are made on each locking handle retainer to cover the sealed area in accordance with TIR requirements.

#### 4.12.2 Lashing fittings

Four (4) lashing hoop rings are welded to each top and bottom side rail at recessed corrugations of side panels but not extruded any cargo space (total 8 rings). Each lashing point is designed to provide a "1,500 kgs pull load in any direction" without any permanent deformation of lashing ring and surrounding area.

Two (2) lashing rods are welded to each corner post at the position of 150mm higher from the floor and 200mm lower from the bottom surface of top corner fittings. Each lashing rod on the corner post is designed to provide a "1,500 kgs pull load in any direction" without any permanent deformation.

#### 4.12.3 Shoring slot

A shoring slot, having a size of 60 mm width x 40 mm depth is provided on each rear corner post so that 2 1/4" thick battens can be arranged to be able to prevent doors from damage due to shifting cargo.

#### 4.12.4 Ventilator

Each container will have four small plastic ventilators of labyrinth type. Each ventilator is fixed to upper part of each side wall by three 5.0mm dia. steel huck bolts in accordance with TIR requirements after drying of top coating, and caulked with sealant around the entire periphery except bottom to prevent the leakage of water.

## 5. Surface preservation

### 5.1 Surface preparation

- 1) All steel surfaces - prior to forming or after - will be fully abrasive shot blasted conforming to Swedish Standard SA21/2 to remove all rust, dirt, mill scale and all other foreign materials.
- 2) All door hardware will be hot-dipping zinc galvanized with approximately 75 microns thickness.
- 3) All fasteners such as self-tapping screws, hinges, cam keepers and lashing fittings will be electro-galvanized with approximately 13 microns thickness.

### 5.2 Primer coating

#### 5.2.1 Prior to assembly

All steel surfaces will be coated with 10-15 microns thick two-pack polyamide cured zinc rich epoxy primer immediately after shot blasting, and then dried up in drying room.

#### 5.2.2 After assembly

- 1) All weldseams will be shot blasted to remove all welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials.  
Then all blasted seams will be coated with zinc rich epoxy primer.
- 2) Exterior of assembled container will be coated again 15-20microns with zinc rich primer and again 40 microns epoxy primer prior to top coating.
- 3) Interior and base of assembled container will be coated again 15-20 microns with zinc rich primer.

### 5.3 Top coating

- 1) After drying of primer, exterior of container will be coated again with Acrylic paint and interior will be coated again with polyamide cured epoxy resin based high build coating.
- 2) The dry film thickness of top coating will be 40 microns for the exterior and 45 microns for the interior.

### 5.4 Under coating

After completion of flooring, all the understructures and floor will be coated with minimum 200 microns dry film thickness underseal coating.

### 5.5 The total dry film will be (Microns):

	<b>EXT.</b>	<b>INT.</b>	<b>BASE</b>
Zinc rich primer	30	30	30
Epoxy primer	40		
Epoxy high build coating		45	
Acrylic	40		
Underseal			200
<b>Total (Min.)</b>	<b>110</b>	<b>75</b>	<b>230</b>
Roof	120		

## 6. Marking

### 6.1 Arrangement

The container will be marked in accordance with ISO, TCT, CSC and TIR requirements, owner's marking specifications and other required regulations.

### 6.2 Materials

1) Decal : - Self-adhesive, cast vinyl film, for seven (7) years guarantee without peeling off, tenting or colour fading.

2) Certification plate: 18-8 type stainless steel plates to be chemically etched by acid and treated by enamel.

### 6.3 Specifications

1) Identification plates such as consolidated data plate consisting of CSC, TIR and TCT will be riveted on the door permanently by stainless steel blind rivets. The entire periphery except the bottom side will be caulked with sealant.

2) The owner's serial numbers and manufacturer's serial numbers will be stamped into the top surface of left-hand and right-hand rear lower corner fittings respectively.

## 7. Testing and Inspections

### 7.1 Testing

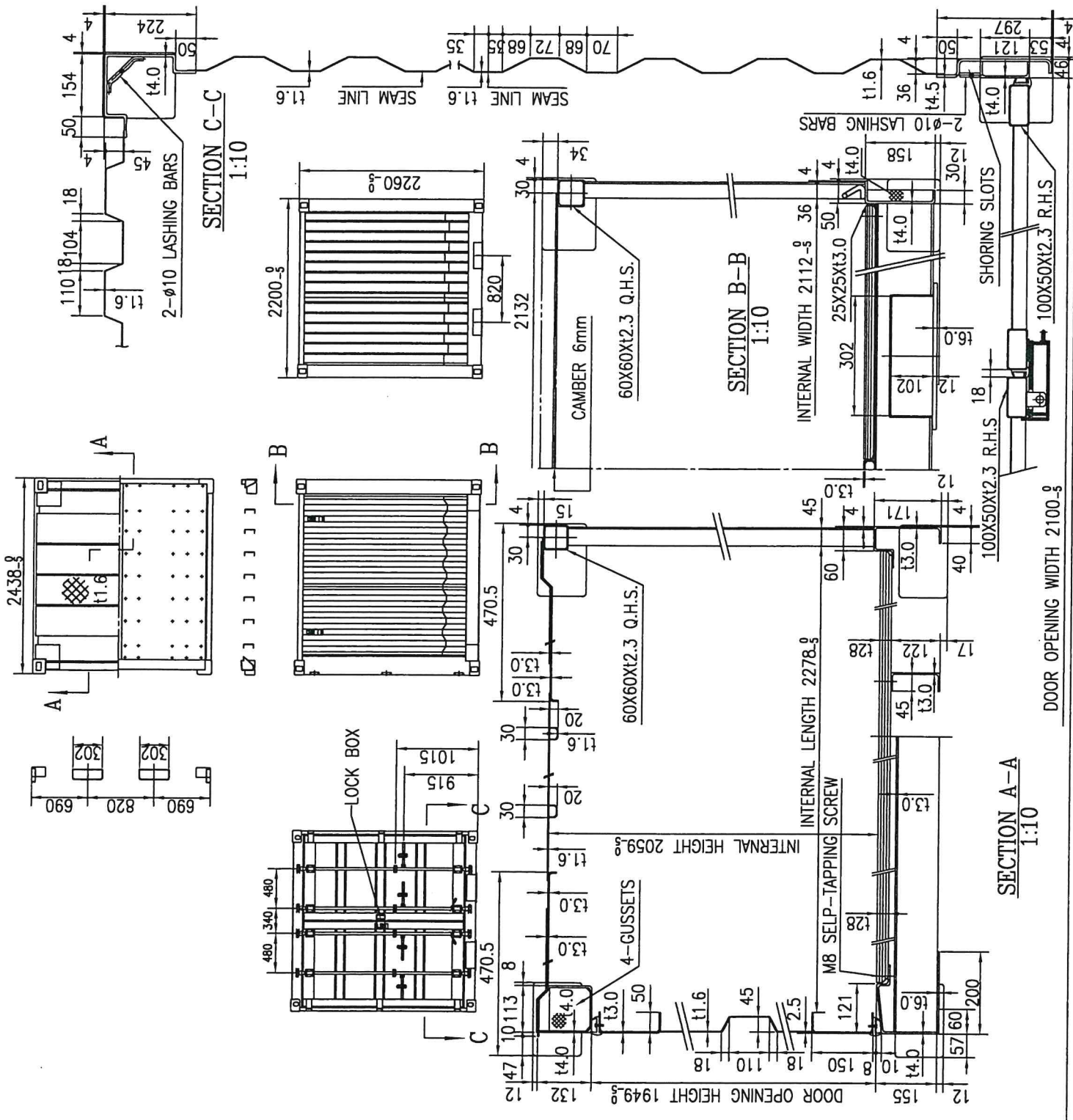
#### 7.1.1 Prototype testing

The prototype container to be manufactured in accordance with this specification will be tested by manufacturer under the supervision of classification society.

	<b>Test items &amp; loads</b>	<b>Test methods</b>
A)	Stacking Internal load : 1.8R-T Test load : 13,500kg/post.	Hydraulic cylinder load will be applied to each corner post through top corner fittings. Offset: 25.4 mm lateral 38.0 mm longitudinal
B)	Lifting (from top corner fittings) Internal load : 2R-T	Lifting 60 degree to the horizontal Time duration : 5 minutes
C)	Lifting (from bottom corner fittings) Internal load : 2R-T	Lifting 60 degree to the horizontal. Time duration : 5 minutes
D)	Lifting (for forklift pockets) Internal load : 1.6R-T	Lifting by horizontal bars. Bar length : 1,828mm Bar width : 200mm
E)	Restraint (longitudinal) Internal load : R-T Test load : 2R	Hydraulic cylinder load will be applied to the bottom side rails.
F)	Floor strength Test load : 5,460 kg (12,038 lb)	Use of a special truck. Total contact area: 284 sq.cm Wheel width : 180 mm Wheel centre : 760 mm
G)	Wall strength (side) Test load : 0.6(R-T)=0.6P	Compressed air bag will be used on one side only.
H)	Wall strength (door and front) Test load : 0.6(R-T)=0.6P	Same as front wall strength test.
I)	Roof strength (weakest part) Test load : 300 kg	Applied area will be 600x300mm longitudinal and transverse.
J)	Operation of door	After completion of test, the operation of doors, locks, hinges, etc. will be checked.
K)	Dimensions and weight	After completion of test, the dimensions and weight will be checked.
L)	Weatherproofness	Inside dia. of nozzle : 12.5mm Distance : 1.5 m

Speed : 100 mm/sec.  
Pressure : 1 kg/sq.cm

\* Note: **R** Maximum Gross Weight  
**T** Tare Weight  
**P** Maximum Payload



EXTERNAL	LENGTH	2,438	0	mm	
	WIDTH	2,200	0	mm	
	HEIGHT	2,260	0	mm	
INTERNAL	LENGTH	2,278	0	mm	
	WIDTH	2,112	0	mm	
	HEIGHT	2,059	0	mm	
DOOR OPENING	WIDTH	2,100	0	mm	
	HEIGHT	1,949	0	mm	
INTERNAL CUBIC CAPACITY		9,906		CU.M	350
MAXIMUM GROSS WEIGHT		6,000		kg	13,230
TARE WEIGHT		950		kg	2,100
MAXIMUM PAYLOAD		5,050		kg	11,130
STACKING TEST LOAD (PER POST)					
FLOOR STRENGTH LOAD					
CLASSIFICATION					
MARKING DRAWING			DIMENSION		
FRONT ASSEMBLY			R/A1 L/A1		
SIDE ASSEMBLY			R/A1 L/A1		
ROOF ASSEMBLY			R/A1 L/A1		
DOOR ASSEMBLY			R/A1 L/A1		
BASE ASSEMBLY			R/A1 L/A1		
DRAWING NO.	DESCRIPTION	REMARK			
		CX07-801-000			
MARKET FILE NO.	NAME	DATE	GENERAL ASSEMBLY		
DESIGNED	DATE	2007.2.27			
CHECKED	DATE	2007.2.27			
APPROVED					