MERCURY
CONTAINER TRADING

TECHNICAL SPECIFICATION

FOR

OPEN-TOP STEEL CONTAINER

20' x 8' x 2191mm TYPE

1. General

1.1 Scope

This specification will cover the design, construction, materials, testing and inspection performances of 20' x 8' x 2191mm type open-top steel 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 (on or below deck), road and rail throughout the world. All materials used in the construction will be to withstand extremes of temperature range from -30°C (-22°F) to +80°C (+176°F) without effect on the strength of the basic structure and watertightness of the containers.

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 [1995 (E)]
ISO 830	--	Terminology in relation to freight container (1999)
ISO 1161	--	Series 1 freight containers - Corner fittings Specification (Amd. 1990)
ISO 1496-1	--	Series 1 freight containers - Specification and testing. part 1: General cargo containers for general purposes (Amd.2 - 1998)
ISO 6346	--	Freight containers - coding, identification and marking - 1995(E)

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 Classification society

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

Note:	BV	:	Bureau Veritas (*France*)
	ABS	:	American Bureau of Shipping (*USA*)
	LR	:	Lloyd's Register of Shipping (*UK*)

1.4 Handling

The container will be constructed to be capable of being handled without any permanent deformation made it unsuitable for use or any other abnormality during the following conditions:

a) Lifting, full or empty, at top corner fittings vertically by means of spreaders fitted with hooks, shackles or twistlocks.

b) Lifting, full or empty, at bottom corner fittings using slings with appropriate terminal fittings at any angles between vertical and 45 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, eight (8) high stacked. (max gross weight 30,480kg)
On the deck of vessels, four (4) high stacked and secured by suitable vertical and diagonal wire lashings.

b) Road : On flat bed or skeletal chassis, secured by twistlocks or equivalent at the four bottom corner fittings.

c) Rail : On flat cars or special container cars secured by twistlocks or equivalent at the four bottom corner fittings.

2. ***Dimensions and Ratings***

2.1 *External Dimensions*

Length	6,058	+ 0mm - 6mm	19'10 1/2"	+0 -1/4"
Width	2,438	+ 0mm - 5mm	8'	+0 -3/16"
Height	2,191	+ 0mm - 5mm	7' 2 17/64"	+0 -3/16"

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 and side diagonals	:	13mm	1/2"
Front and rear diagonals	:	10mm	3/8"

2.2 *Internal Dimensions*

Length	5,841	+ 0mm -10mm	19' 1 61/64"	+0 -25/64"
Width	2,349	+ 0mm - 5mm	7' 8 31/64"	+0 -3/16"
Height	1,944	+ 0mm - 5mm	6' 4 17/32"	+0 -3/16"

2.3 *Door opening dimensions*

Width	2,340	+ 0mm - 5mm	7' 8 1/8"	0 -3/16"
Height	1,882	+ 0mm	6' 2 3/32"	0

2.4 *Front discharge opening dimensions*

Width	2,122	+ 0mm - 5mm	6' 11 35/64"	0 -3/16"
Height	1,000	+ 0mm - 5mm	3'3 3/8"	0 -3/16"

2.5 *Internal cubic capacity (Nominal)*

26.7 cu.m	944	cu.ft

2.6 *Forklift pockets dimensions (Nominal)*

Width	360 mm
Height min.	115mm
Centre to centre	2,050 mm +/-50mm

2.7 *Ratings*

Max. Gross Weight (R)	36,700 kgs	80,910 lbs
Tare Weight (design) (T)	3,500 kgs	7,720 lbs
Max. Payload (P)	33,200 kgs	73,190 lbs

Tare Weight Tolerance **2%**

3. Materials

3.1 General

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

3.2 Part specification

	Parts	***Materials***
1)	Door panels Side panels Front & rear panels Top side rail Cross members Bottom side rails Fork pockets Door header Door horizontal & vertical frames Front corner posts Top end rail Bottom end rail Rear corner posts (outer)	Anti-Corrosive Steel: CORTEN A, SPA-H, B480 or equivalent Y.P. : 35 kg/sq.mm T.S. : 49 kg/sq.mm
2)	Roof rows Protection channel Front corner posts (inter)	Structural Steel SS400 Y.P. : 25 kg/sq.mm T.S. : 41 kg/sq.mm
3)	Door Locking bars	Structural Steel round pipe. STK41 Y.P. : 25 kg/sq.mm T.S. : 41 kg/sq.mm
4)	Corner Fitting	Casted weldable steel. SCW480 Y.P. : 28 kg/sq.mm T.S. : 49 kg/sq.mm
5)	Locking gear cams and keepers	Forged weldable steel. S20C Y.P. : 23 kg/sq.mm T.S. : 44 kg/sq.mm
6)	Door hinge pins Door gasket retainer	Stainless steel. SUS304
7)	Door gasket	EPDM
8)	floor	6.0mm flat stainless steel floor
9)	Tarpaulin cover	P.V.C

* 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 and end wall, a vertical-corrugated steel single door at front wall underside, flat stainless steel flooring, removable roof bows & tarpaulin cover and corner fittings.

4.1.2 One pair of fork pockets and a removable header will be provided.

4.1.3 All steelwork will be built up by means of automatic and semi-automatic CO_2 gas arc welding (MAG welding). All welds of exterior including the base frames will be continuous welding on both sides except welds of joints for flooring.

4.1.4 Interior welds will be intermittent with a minimum bead length of 15mm for every 300mm about.

4.1.5 Welds will be even bead and have full penetration without undercutting or porosity.

4.1.6 Gaps between adjacent components to be welded will not exceed 3mm or the half thickness of the parts being welded which is the smaller

4.1.7 Sealant is to be applied at inside unwelded seams, butyl sealant is used to caulk at invisible seam of floor joint area and between door gasket and frame.

4.2 Protrusion

4.2.1 The upper faces of the top corner fittings will protrude above the highest level of the roof bows except corner plates more than 10mm.

4.2.2 For the containers under empty condition the lower faces of the cross member in their bases including their end transverse members shall be on a plane located at 17mm above the lower faces of the bottom corner fittings except the corner plates.

4.2.3 The outside faces of the corner fittings will protrude from the outside faces of the corner posts by minimum 3mm for side structure and 4mm for front end structure.

4.2.4 The outside faces of the corner fittings will protrude from side wall by nominal 7mm and from the outside face of the end wall by 8mm.

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, two set of forklift pockets and totally fifteen (15) cross members.

4.4.1 Bottom side rail

Each bottom side rail is built of a 155x52x30x28xt4.5mm thick cold formed double "Z" section steel made in one piece.

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/10.0mm thick steel plate is welded to bottom corner fitting.

4.4.2 *Forklift pockets*

Each forklift pocket is built of 6.0mm thick full depth " Ω " section steel top plate and two 200mm deep x 8.0mm thick flat lower end plates
4.0mm thick flat steel plate to be welded to fork pocket at the top of each end and 4.0mm thick angle section steel to be welded to fork pocket at both side of each end.

4.4.3 *Cross member*

The cross members are made of pressed channel section steel with a dimension of 45x125x45x4.5mm for the normal areas .The cross members are placed fully to withstand floor strength and welded to each bottom side rail.

4.5 *Flooring*

The floor will be made of 6.0mm thick flat stainless steel panels; the floor edge will be continuously fully welded with side rails, door sill and bottom end rail at the interior of the container, and stitch welding underneath.

4.6 *Rear frame structure*

The rear 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 to be made of 4.5mm thick pressed open section steel is reinforced by four internal gussets of 4.0mm thick at the back of each locking cam keeper location.
A 200x75mm section is cut out at each end of the door sill and reinforced by 200 x 75mm channel steel as a protection against handling equipment damages.

4.6.2 *Rear corner post*

Each rear corner post of hollow section is fabricated with 6.0mm thick pressed steel outer part and 40x113x12mm hot-rolled channel section steel inner part, which are welded continuously together to ensure a maximum width of the door opening and to give a sufficient strength against stacking and racking forces.
Five(5) sets of hinge pin lugs are welded to the door header.

4.6.3 *Door header*

The door header is constructed with 4.0mm thick pressed "U" section steel lower part having four internal gussets at the back of each locking cam keeper location and 4.5mm thick pressed steel upper part, which are formed into box section by continuous welding. The removable header is capable of swinging to either side through an arc greater than 90 degrees.
The removable header is supported by two hinges.
Stainless hinge pin and provided with a suitable EPDM rubber gasket to prevent the leakage of the water into the container.
The hinge pins additional a small chain to prevent the pins drop down and even disappears when removable the headers away.
The staple rings for fastening the tarpaulin cover by customs cable are made of 6.0mm diameter.

4.7 *Door*

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

4.7.2 Each door is constructed with 3.2mm thick pressed channel section steel horizontal frames for the top and bottom, 100x50x4.0mm thick rectangular hollow section vertical frames, 3.0mm thick horizontally corrugated steel door panel, which are continuously welded within frames.

4.7.3 Two sets of galvanized locking assemblies which is the Sae Jin "SJA00", Shanghai Haihang "HH-ET/S Modified" or Suraloc "SL-F/5", "SL-F/6" with secura cam and anti theft handle are fitted to each door wing using huck bolts, among them six(6) TIR bolts are huck bolts according to TIR requirements. Locking bar retainers are fitted with bushings of selflubricating synthetic material at the top, bottom and intermediate bracket. EPDM shims should be placed between door hardware and door panels in order to protect the paint in those areas. The customs holes on all handles, retainers, and catches are needed.
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 four reinforced hinges being provided with stainless steel pins, brass bushings and brass washers, which are placed at the hinge lugs of the rear corner posts.

4.7.7 The door gasket made of an extruded triple lip type (J-C type - vertical and upper are "J", lower is "C") EPDM rubber is installed to the door peripheral frames with pressed angle section stainless steel gasket retainers and fastened by SUS304 stainless steel rivets at peach of 150mm. The door gasket must be caulked with butyl sealant before installation to the door frames..

4.8 *Roof structure*

The roof will be constructed with eight (8) roof bows and removable tarpaulin cover. The customs cable will be used to secure the tarpaulin cover.

4.8.1 *Roof bows*

The removable roof bows are made of 34mm diameter steel tube and will be hot-dipping zinc galvanized. Both end of each bow are suspended by the roof bow retainers which welded to each top side rail.
Each roof bow is cambered upwards with about 30mm to easily run-off the water.

4.8.2 *Tarpaulin cover*

Tarpaulin is made of polyester fibre cloth coated with P.V.C. with SUS304 eyelets around hem and with reinforcements on all spots contacted with frames and roof bows (tarpaulin will be of specification stated in Appendix A or equivalent).

4.8.3 *Customs cable*

The transparent PVC covered 6.0mm dia. steel rope with 3.0mm dia steel wire core is used to ensure the tarpaulin cover in accordance with TIR requirement.
The brass end-pieces of steel rope are to be capable of accepting the self-locking strap.

4.9 *Top side rail*

4.9.1 Each top side rail consists of an inner part (inwards to the container) and outer part (outwards to the container) which is at 4.0mm thick welded together to form a 260 high x 80mm wide hi-strength closed box section. At the recess of inner part there is a row of roof bow beam keepers (8pcs./rail) installed at a pitch of 690 mm. These keepers are used to hold the roof bow beams. At the middle recess of outer part there is a row of TIR rings (29pcs./rail) installed at a pitch of 200 mm. Through these rings, the TIR cable fixes the tarpaulin cover closely to the top of the container. Inside the closed box section, a full long t3.0mm "C" section stiffeners with ten (10) holes are welded on the back of the middle recess of the top side rail outer at a pitch of 1000mm, and plug welded to the inner part. At the bottom of the left top side rail, near the door, a 27xt2.5 mm tube is vertically welded. The TIR customs cable is threaded through the tube for securing.

4.9.2 *Corner drainage plate*

The corner drainage is made of a 6.0mm thick plate connecting the door header and side top rail, welded together to form a drainage plate. Then it strengthens the frame rigidity and available to drain the water.

4.10 *Side wall*

The trapezium section side wall is constructed with 3.0mm thick flat steel panels for the intermediate part and both end parts which are butt welded together to form one panel and continuously welded to the side rails and corner posts. All overlapped joints between corner posts and side panels and unwelded joints between top/bottom rails and side panels are caulked inside with sealant. There are 3.0mm thick 'u' section steel post welded to the side wall outside.

4.11 *Front structure*

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

4.11.1 *Bottom end rail*

The bottom end rail to be made of 4.5mm thick pressed open section steel is reinforced by three internal gussets. A 200x75mm is cut out at each end of the bottom end rail and reinforced by 200x75mm channel steel as a protection against handling equipment damages.

4.11.2 *Front corner post*

Each corner post is made of 6.0mm 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 front header is constructed of two (2) t4.0mm steel pressings. The inner and outer parts are welded together to form a 80 x 260 x 60 mm hi-strength, closed box section. a full long t3.0mm "C" section ribs are welded to the outer piece. After the inner and outer pieces are joined, two holes are drilled through the inner piece at each "C" section rib to facilitate plug welding.

4.11.4 *Front wall*

The trapezium section front wall is constructed with 3.0mm thick vertically corrugated steel panels and 2.0 flat panel welded together to form one panel, and continuously welded to front end rails and corner posts. All overlapped joints between corner posts and front panels and unwelded joints between top/bottom rails and front panels are caulked inside with sealant.
At the bottom of front wall will have one discharge hatch, It is composed of one discharge door, one set of galvanized locking assemblies and a suit of the gasket of discharge door.

4.11.5 Front discharge hatch frame

The front discharge hatch frame will be composed of one 4.5 mm thick special welding box shaped header, 4.0 mm thick special welding boxes shaped corner posts and the front sill, which are welded together as a sub-assembly.

4.11.6 Front discharge hatch

The front discharge hatch will be constructed with 3.0 mm thick vertically corrugated steel panel, 4.0 mm thick rectangular pips and locking assembly. the front discharge hatch frame will be installed by hinge pins to the front discharge hatch frame

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 Inside partly with stainless steel cover plate

Side walls Inside: Add 1.5mm stainless steel panels on top of corten steel side walls (underneath of top side rails).

Front wall Inside: Add 1.5mm stainless steel panel to upper part of corten steel front wall (underneath of top side rail).
Add one sliding edge 1.5mm stainless steel panel each corner to support discharge of waste material through

Rear end: Add 1.5mm stainless steel panels on top of door panels.

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 SA2*1/2* 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. Locking bolts hot-dipping zinc galvanized approximately 30 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 weldments will be shot blasted to remove all welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials.
Then all blasted weldments will be coated with zinc rich epoxy primer.
2) Exterior and interior of assembled container will be coated again 15-20 microns with zinc rich epoxy primer and again 40 microns epoxy primer prior to top coating.
3) Base of assembled container will be respective coated 15-20 microns with zinc rich epoxy primer prior.

5.3 *Top coating*

1) After drying of primer, exterior and interior of container will be coated again with high build Acrylic resin paint, the dry film thickness of top coating will be 50 microns.

2) All the areas of outside of the container which could be in contact with tarpaulins shall be coated Varnish 0333 or protective coating with 25 μ DFT before tarpaulins are installed.

5.4 *Under coating*

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

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

	EXT. and INT.	**BASE**
Zinc rich primer r	30	30
Epoxy primer	40	
Acrylic resin coating)	50	
Bitumen		200
Total (Min.)	120	230

Epoxy zinc rich primer and epoxy primer and top coating are not applied to a inter stainless steel plate.

6. ***Marking***

6.1 *Arrangement*

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

6.2 *Materials*

1) Decal : - Self-adhesive, high tensile 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 and TIR will be riveted on the door permanently by stainless steel rivets. The entire periphery except the bottom side will be caulked with sealant.

7. *Testing and Inspections*

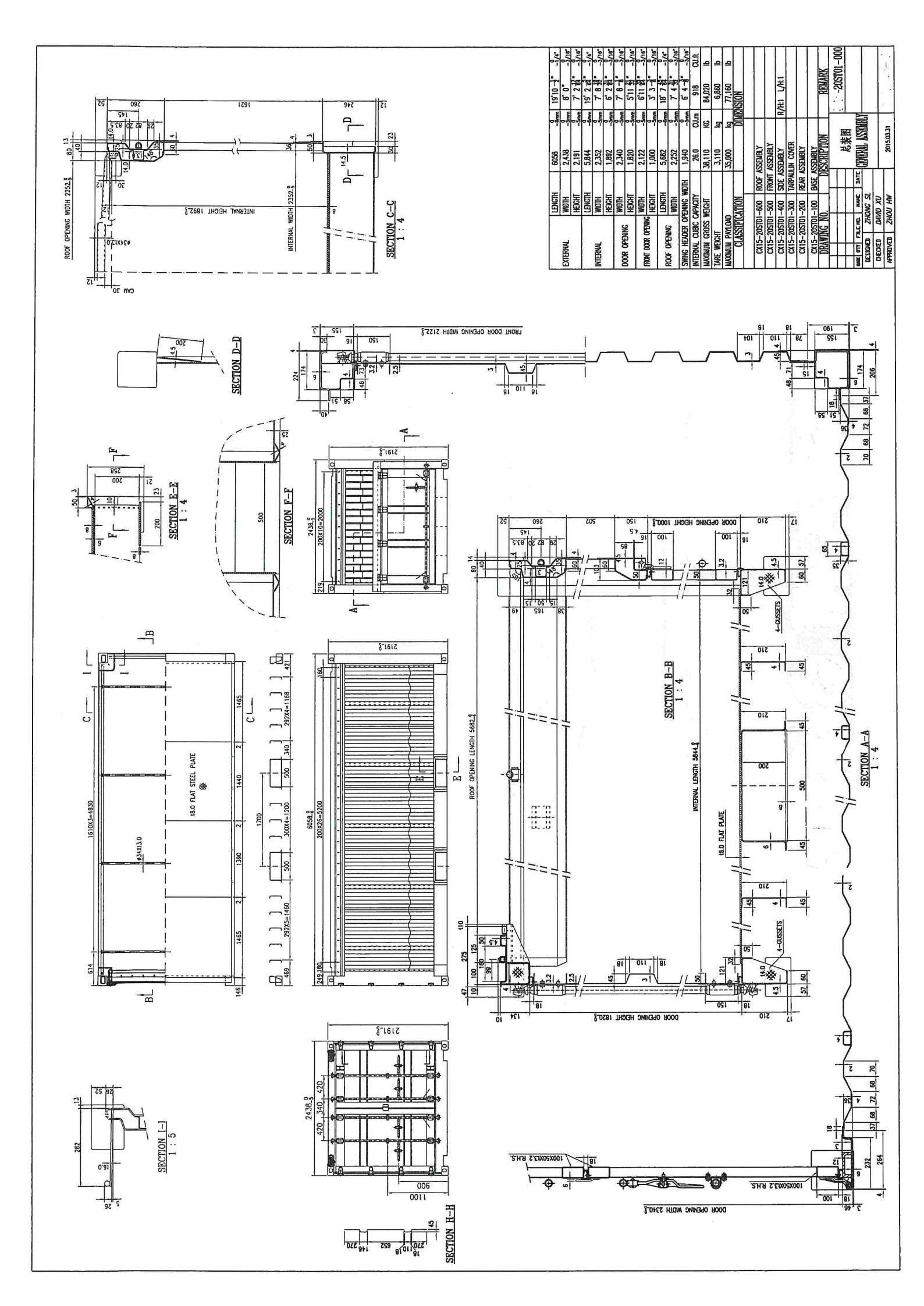
7.1 Testing

7.1.1 Prototype testing

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

	Test items & loads	**Test methods**
A)	Stacking Internal load : 1.8R-T Test load : 97,200kg/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 vertically. Time duration : 5 minutes
C)	Lifting (from bottom corner fittings) Internal load : 2R-T	Lifting 45 deg. to the horizontal. Time duration : 5 minutes
D)	Lifting (for forklift pockets) Internal load : 1.6R-T(outer) 0.625R-T(inner)	Lifting by horizontal bars. Bar length : 1,828mm Bar width : 200mm Time duration : 5 minutes
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 kgs (12,040 lbs)	Use of a special truck. Total contact area: 284 sq.cm Wheel width : 180 mm Wheel centre : 760 mm
G)	Wall strength (front) Test load : 0.6(R-T)=0.6P	Compressed air bag will be used.
H)	Wall strength (side) Test load : 0.6(R-T)=0.6P	Compressed air bag will be used on one side only.
I)	Wall strength (door) Test load : 0.6(R-T)=0.6P	Same as front wall strength test.
J)	Racking (transverse) Test load : 15,240 kgs	Hydraulic cylinder load will be applied to the header rail through top corner fittings.
K)	Racking (longitudinal) Test load : 7,620 kgs	Hydraulic cylinder load will be applied to the top side rail through top corner fitting on one side only. Two times for pulling and pushing.
L)	Operation of door	After completion of test, the operation of doors, locks, hinges, etc. will be checked.
M)	Dimensions and weight	After completion of test, the dimensions and weight will be checked.
N)	Weatherproofs	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	6058	0 -5mm	19'10 -3/16"	0 -3/16"
	WIDTH	2,438	0 -5mm	8' 0"	0 -3/16"
	HEIGHT	2,191	0 -5mm	7' 2 13/16"	0 -3/16"
INTERNAL	LENGTH	5,844	0 -5mm	19' 2 3/16"	0 -3/16"
	WIDTH	2,352	0 -5mm	7' 8 3/16"	0 -3/16"
	HEIGHT	1,892	0 -5mm	6' 2 13/16"	0 -3/16"
DOOR OPENING	WIDTH	2,340	0 -5mm	7' 8 1/16"	0 -3/16"
	HEIGHT	1,820	0 -5mm	5'11 3/16"	0 -3/16"
FRONT DOOR OPENING	WIDTH	2,122	0 -5mm	6'11 9/16"	0 -3/16"
	HEIGHT	1,000	0 -5mm	3' 3 3/8"	0 -3/16"
ROOF OPENING	LENGTH	5,682	0 -5mm	18' 7 7/16"	0 -1/4"
	WIDTH	2,252	0 -5mm	7' 4 3/16"	0 -3/16"
SWING HEADER OPENING WIDTH		1,940	0 -5mm	6' 4 3/8"	0 -3/16"
INTERNAL CUBIC CAPACITY		26.0	CU.m	918	CU.ft
MAXIMUM GROSS WEIGHT		38,110	KG	84,020	lb
TARE WEIGHT		3,110	kg	6,860	lb
MAXIMUM PAYLOAD		35,000	kg	77,160	lb
CLASSIFICATION		DIMENSION			

DRAWING NO.	DESCRIPTION	REMARK
CX15-20ST01-600	ROOF ASSEMBLY	
CX15-20ST01-500	FRONT ASSEMBLY	
CX15-20ST01-400	SIDE ASSEMBLY	R/H:1 L/H:1
CX15-20ST01-300	TARPAULIN COVER	
CX15-20ST01-200	REAR ASSEMBLY	
CX15-20ST01-100	BASE ASSEMBLY	

总装图

				-20ST01-000
				GENERAL ASSEMBLY
MARK	QTY	FILE NO.	NAME	DATE
DESIGNED			ZHONG SL	
CHECKED			DAVID XU	
APPROVED			ZHOU HW	2015.03.31