

Technical Specification
For
20' x 8' x 8'6" ISO Type
Dry Cargo Steel Container

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Scope

This specification covers design, construction, materials, testing, inspection & prototype container. The container is built in accordance with the requirements of I.S.O. 1CC Type steel dry freight containers by Qingdao RuiJunYuan .

Contents

1. GENERAL	2
2. APPROVAL AND CERTIFICATES	3
3. HANDLING	3
4. TRANSPORTATION	4
5. DIMENSIONS AND RATINGS	4
6. GENERAL CONSTRUCTION	5
7. PRESERVATION	11
8. MARKINGS	12
9. TESTING AND INSPECTION	13

1. GENERAL

1.1 Operational Environment

The container will be designed and constructed for the transportation of general cargo on sea (above or under deck) and on land (road or rail) throughout the world, and will be suitable for the environmental conditions imposed by those modes of transport. All materials used in the container are able to withstand extremes of temperatures found throughout the shipping area's of the world without any effect on their strength, watertightness, or other operating abilities within the temperature ranges from -40°C(-40°F) to 70°C(158°F).

1.2 Standards , Regulations and Rules

1.2.1 Standards and Regulations

Containers shall comply with following in their latest editions:

- 1) I.S.O./TC-104

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- 668 - Series 1 freight containers-Classification, external dimensions and ratings
 - 6346 - Coding, identification and marking for freight containers
 - 1161 - Specification of corner fittings for series 1 freight containers
 - 1496/1 - Specification and testing of series 1 freight containers.
Part 1 : General cargo containers for general purposes 830
 - Freight containers-Terminology.
 - 3874 - Freight containers-Handling and securing
 - 2) The International Union of Railway (UIC) code IRS 50592:2019.
 - 3) The Customs Convention on the International Transport of Goods(T.I.R.).
 - 4) The International Convention for Safe Containers (CSC).
 - 5) Transportation Cargo Containers and Unit Loads Quarantine Aspects and Procedures by Commonwealth of Australia Department of Health. (T.C.T.) **1.2.2** To satisfy the requirements of Rules of CCS,B.V, A.B.S. or G.L. Classification.

2. APPROVAL AND CERTIFICATES

2.1 Classification Certificate

All the containers shall be certified for design type and individually inspected by Classification Society.

2.2 Production Certificate

The Production Certificate of series containers to be issued by the Classification Society. The Society's seal shall be provided.

2.3 T.C.T Certificate

Certificate of timber treatment to the requirement of Australia Department of Health.

2.4 Customs Certificate (T.I.R.)

Customs' Approval and Certificate to be issued by the Customs.

2.5 U.I.C. Registration

All the containers will be registered & comply with the International Union of Railways.

2.6 C.S.C. Certificate

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

3. HANDLING

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

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

- 2) Lifting, full or empty, at the bottom corner fittings using slings with appropriate terminal fittings at slings angle of forty-five (45°) degree to horizontal. 3) Lifting, full or empty, at two fork pockets by fork lift truck.

4. TRANSPORTATION

The container will be constructed to be suitable for transportation for following modes without any permanent deformation which will render the container unsuitable to use or any abnormality.

4.1 Marine:

- **In the ship cell guides:** Eight (8) high stacked base on Max. gross weight 30,480 kg (Stacking capacity: 216,000 kgs)
- **On the deck :** Four (4) high stacked and secured by suitable vertical and diagonal wire lashings.

4.2 Road - On flat bed or skeletal chassis:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

4.3 Rail - On the flat cars or special container car:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

5. DIMENSIONS AND RATINGS

5.1 Dimension

	<u>External Dimensions</u>	<u>Internal Dimensions</u>
Length	6,058 (0, -6) mm	5,898 (0, -6) mm
Width	2,438 (0, -5) mm	2,352 (0, -5) mm
Height	2,591 (0, -5) mm	2,393 (0, -5) mm

No part of the container will protrude beyond the external dimensions mentioned above.

Maximum allowable difference between two diagonals on any one of the following surfaces is as follow:

Roof, Bottom and Side Diagonals	.....	13 mm.
Front and Rear Diagonals	.....	10 mm.

5.2 Door Opening

Width	.....	2,340 (0,-5) mm
Height	.....	2,280 (min.) mm

5.3 Fork Pocket

Width	.....	360 mm
Height	.....	115 mm

Center distance 2,080 mm

5.4 Inside Cubic Capacity

33.2 cu.m 1,172 cu.ft

5.5 Rating

Maximum Gross Weight	30,480 kg	67,200 lb
Maximum Payload	28,360 kg	62,530 lb
Tare Weight (±2%)	2,120 kg	4,670 lb

5.6 Corner Protrusions

- 1) The upper faces of the top corner fittings will protrude above the highest level of the roof construction except corner plate by 6 mm.
- 2) For the containers under empty condition the lower faces of the cross members in their bases including their end transverse members shall be on a plane located at 12.5 (+5, -1.5) mm above the lower faces of the bottom corner fittings except the corner plates.
- 3) The outer side faces of the corner fittings will protrude from the outside faces of the corner post by about 3 mm. The outer side faces of the corner fittings will protrude from the outside faces of the side wall by nominal 7 mm and from the outside faces of the end wall by 7.4 mm.
- 4) For the containers under the condition such as the load equal to 1.8R - T is uniformly distributed over the floor, no part of the container base will deflect by more than 6 mm below the lower faces of the bottom corner fittings.

6. CONSTRUCTION

6.1 General

The container will be constructed with steel frames, fully vertically corrugated steel side and end walls, die-stamped corrugated steel roof, wooden flooring, corrugated double hinged doors and ISO corner fittings at eight corners. All steelworks will be built up by means of automatic and semi-automatic CO2 gas arc welding. All exterior weldings including that on base structure will be continuous to give perfect watertightness, Interior welds will be intermittent with a minimum bead length of 25 mm for every 200 mm. All the welds, even spots, will have penetration without undercutting or porosity. The tolerance of steel plate thickness will obey JIS standard G3193-1990, table 4.

6.2 Corner Fittings

Corner fittings will be designed in accordance with ISO/1161 standard, and manufactured at the workshops approved by the Classification Society.

6.3 Base Frame

The base frame will be composed of two (2) bottom side rails, a number of cross-members and a pair of fork pockets, which are welded together as a sub-assembly.

6.3.1 Bottom Side Rail

Each bottom side rail is built of a steel pressing made in one piece. The bottom flange faces outwards so as to be easily repaired and hard to corrode.

Qty. : Two (2).
 Shape : Double " Z " section
 Dimension : 155 x 52 x 30 x 28 x 4.5 mm.

6.3.2 Crossmember

The crossmembers are composed of a number of small pressed channel section and some large one located beneath each board joint of the plywood with three 4 mm thick webs .

Shape : Channel section
 Small one : 122 x 45 x 45 x 4.0 mm , Qty. : 16
 Large one : 122 x 75 x 45 x 4.0 mm , Qty. : 2

6.3.3 Fork Pocket

One pair of fork pockets will be provided in accordance with ISO requirements for loaded handling. Each fork pocket is constructed with two adjacent crossmembers, a top plate and two bottom end plates. An angle stiffener plate will be welded to each opening of fork pocket.

Top plate : 3.0 mm Thk.
 Bottom plate : 6.0 mm Thk., Depth : 200 mm
 Stiffener plate : 4.5 mm Thk.

6.3.4 Reinforcement

Reinforcement plate will be welded to each end of bottom side rail.

Dimension: 200 x 120 x 4.0 mm

6.4 Front End

The front end will be composed of corrugated end wall and front end frame, which are welded together as a sub-assembly.

6.4.1 Front End Wall

The front end wall is composed of steel sheet fully vertically corrugated into trapezium section, butt joint together to form one panel by means of automatic welding.

Thickness: 2.0 mm
 Corrugation dimension- Depth : 45.6 mm ,
 Inter face : 104 mm , Slope : 18 mm
 Outer face : 110 mm , Pitch : 250 mm

6.4.2 Front End Frame

The front end frame will be composed of one front sill, two corner posts, one front header and four corner castings.

6.4.2.1 Front Sill

The front sill is made of a special "C" section steel pressed with vertical webs as the stiffener. Two channel section steel recesses are provided in the lower end rail adjacent to the bottom fittings to prevent damage due to any twistlock misalignment. Top of damage protectors channels are completely closed with 4.0mm thick, fully welded Corten closure gussets.

Front sill	: 4.5 mm Thk.
Web	: 4.0 mm Thk. , Qty.: 3 Pcs.
Channel section	: 200 x 75 x 9 mm

6.4.2.2 Corner Post

Each corner post is made of a 6.0 mm thick section steel pressing to ensure the suitable strength, light-weight and easy maintenance.

6.4.2.3 Front Header

The front header is constructed of one 4.0 mm thick " Z " shaped pressing steel plate. The inner part is extended inwards of the container certain distance with full width from front part of top corner fittings.

6.5 Rear End

Rear end is composed of Rear End Frame which consists of one door sill, two corner posts, one rear header with header plate and four corner fittings, which are welded together as a sub-assembly, and Door Systems which are with locking devices.

6.5.1 Door Sill

Door sill is built of a special channel section steel pressing with stiffeners at the back of each cam keeper. The upper face of the sill has a slope for better drainage and the highest part is on the same level to the upper face of the wooden floor. Two channel section steel recesses are provided in the door sill adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Door sill	: 4.5 mm Thk.	Stiffener ribs	: 4.0 mm Thk.
Slope	: 1 : 10 approx	Channel section	: 200 x 75 x 9 mm

6.5.2 Corner Post

Each corner post is constructed from an inner part of channel shaped hot-rolled section steel and an outer part, welded together to form a hollow section to ensure suitable strength against the stacking and racking force. Four (4) sets of hinge pin lugs are welded to each outer part of the corner post.

Inner part	: 113 x 40 x 12 mm
Outer part	: 6.0 mm thick

6.5.3 Door Header

The door header is constructed from a lower part of a "U" shaped steel pressing with four internal stiffener ribs and an upper part of steel pressing rear header plate, they are welded together to form a box section to provide a high rigidity.

Rear header : 4.0 mm Thk.

Header plate : 3.0 mm Thk.

Stiffener ribs : 4.0 mm Thk., Qty.: 4

6.5.4 Door Systems

Doors will consist of two door leaves, each leaf with two locking devices, four hinges and pins, seal gaskets and the door holders. The doors will be installed by hinge pins to the rear end frame and capable of swinging to 270 degrees smoothly.

6.5.4.1 Door Leaves

Each leaf consists of door panel, steel door frame which consists of horizontal (upper & lower) and vertical (inner & outer) members. They are welded together to form the rectangular door leaf. The doors are so arranged that the left leaf can not be opened without displacement of the right leaf.

a. Door Panel : With 5 corrugations

Depth : 36 mm, Slope : 68 mm

Width : 72 mm, Panel thickness : 2.0 mm

b. Door Frame

(1) Vertical door member : 100 x 50 x 3.2 mm RHS (outer & inner).

(2) Horizontal door member : 150 x 50 x 3 mm, Channel section.

6.5.4.2 Hinges and Pins

Four forged hinges, providing with bushed hole, are welded to each door leaf. Each door is installed by hinge pins, washers and bushings. Washer : SUS 304, under the bottom of hinge

Bushing : Nylon Pin :

SUS 304

6.5.4.3 Locking Devices

Two locking bars are of steel tube with forged handles, anti-racking rings and cam ends, and fixed to each door leaf with bolts / nuts and six huck bolts at TIR locations, by top and bottom bearing brackets and two bar guide brackets. The bars are suspended in bearing brackets with bush of self-lubricating synthetic material.

Cam-keepers are welded to the door header and sill.

a) Locking device: with with secura cam and keeper

b) Locking Bar Treatment: Hot-Dip galvanized (Min. 75μ)

6.5.4.4 Door Holder and Receptacle

A door holder per door, made of mixed nylon rope, is tied to the centerside of locking rod and the receptacle (hook type) is welded to each bottom side rail to remain the door at the open position.

6.5.4.5 Seal Gaskets

The door seal gaskets are special E.P.D.M rubber and of a "C" type for the bottom, "J" type for the other side, assembled by rivets, using angle type strips retainer and adhesive sealant is applied underneath the gasket before installation. Right door top corner gasket overlapping the left door has bigger.

Retainer : Stainless

Rivet : Stainless

6.6 Side Wall Assembly

6.6.1 Top Side Rails

Each top side rail will be made of a square steel pipe.

Rail : 60 x 60 x 3.0 mm RHS

6.6.2 Side Walls

Each side wall will be composed of a number of sheets for the intermediate (inner) parts and outer panels at each end of side wall, fully vertically corrugated into trapezium section, butt welded together to form one panel by automatic welding.

a) Inner panel : 1.6 mm Thk. , Qty. :3 Pcs/side

b) Outer panel : 2.0 mm Thk. , Qty. :2 Pcs/side

c) Trapezium - Depth : 36 mm

Outer face : 72 mm , Slope : 68 mm

Inner face : 70 mm , Pitch : 278 mm

6.7 Roof

The roof will be constructed by several die-stamp corrugated steel sheets with a certain upwards camber at the center of each trough and corrugation, these sheets are butt jointed together to form one panel by automatic welding.

Corrugation Shape - Depth : 20 mm , Pitch : 209 mm

Inter face : 91 mm , Slope : 13.5 mm

Outer face : 91 mm ,

Camber upwards : 5 mm

Panel thickness : 2.0 mm

Sheets Qty. : 5 Pcs.

6.7.1 Roof reinforcement plate

Four reinforcement plates shall be mounted around the four corner castings.

6.8 Floor

6.8.1 The floor consists of plywood. The plywood is treated with wood preservative containing according to the latest requirement of the Commonwealth Department of Health, Australia.

Plywood thickness	: 28 mm
Plywood moisture content	: Less than 14 %
Plywood plies Qty.	: Min.19 plies

6.8.2 Arrangement and Fixing

The plywood boards are longitudinally laid on the crossmember with a pre-blasted painted and free floating flat steel at the center, two angle steel along both side rails. The angle steels shall be primed and painted with interior coating separately. The plywood boards are tightly secured to each crossmember with countersunk self-tapping electro-zinc plated steel screws. These heads of the floor screws are countersunk below the level of the upper surface of the floor by 1.5 mm to 2.5 mm.

Screws	: M8 x 45 x ϕ 16 (head), electro-zinc plated;
Screw's Qty.	: 6 Pcs/joint, 6 Pcs/door and front sill, 4 Pcs/other,
Floor centre rail	: 50 x 4 mm, Primed and painted
Angle steel	: 3.0 mm Thk.

6.9 Special Features

6.9.1 Customs Seal Provision

Customs seal devices are made on each locking handle and retainer in accordance with TIR requirements with rivets.

6.9.2 Lashing rings

1) Lashing rings are welded to each bottom and top side rail at corresponding recessed area of side wall at equal distance.

Lashing rings' Qty./ Bottom or top side rail: 5, Total : 20

2) Lashing rods are welded on each rear & front corner post slot, and on each top corner fitting.

Lashing rods Qty. / Each front corner post : 2, Total : 4

Lashing rods Qty. / Each rear corner post : 2, Total : 4

3) Capabilities of pull load of every lashing point are as following:

a) Lashing rings on the side rails : Working load = 1,500 kg

b) Lashing rods on the corner post : Working load = 1,000 kg 4)

Lashing ring/ bar's surface treatment : Electro-zinc plated (13 \square).

6.9.3 Ventilator

Five ventilators with E.P.D.M seal gasket is supplied on each side wall at the right-hand end when facing the side from outside of container, fixed by three aluminum huck bolts, the seal is to be applied on the edges except the bottom side of the ventilator, after the completion of paint.

Quantity : 5 / each side panel
Material : ABS Labyrinth Type.

7. PRESERVATION

7.1 Surface Preparation of the Steelwork

- 1) All the steel surface prior to forming or after will be degreased and shot blasted to Swedish Standard SA 2.5 to obtain the surface roughness at 25 to 35 μ which can result in the removal of all the rust, dirt, mill scale and all other foreign materials.
- 2) Locking rod assemblies, which are welded with gear cams, bars holder and handle hinges, are hot dipping galvanized (Thickness : 75 μ).
- 3) All fasteners not mentioned in this Spec., such as bolts, nuts self-tapping screws will be electro zinc plated (Thickness : 13 μ).
- 4) Sealant
Each perimeter of the floor, all the overlapped joints of inside, all the holes for bolts and nuts and all the places where may leak water will be sealed to give prevention against water entry.

Sealant Materials:

- a. waterborne /Chloroprene (Cargo contact area)
- b. Butyl (Hidden parts)

7.2 Coating

7.2.1 Prior to Assembly

All the steel surfaces will be primed with Zinc Rich Primer immediately after shot-blasting.

7.2.2 After Assembly

All the weld joints will be shot-blasted to remove all the welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials, and followed with the secondary paint operation immediately.

7.2.3 All the surface of the assembled container will have coating system as follows :

Process	Paint Name	DFT (μ)
Exterior Surface	Epoxy zinc rich primer	30
	epoxy primer	40
	acrylic topcoat, color:	40
	Total :	110
Interior Surface	Epoxy zinc rich primer	30
	epoxy topcoat, color: RAL 7035	50

	Total:	80
Under Structure	Epoxy zinc rich primer	30
	Waterborne undercoating	200(steel parts) 100(floorboard)
	Total:	230(steel parts)

* Epoxy zinc rich primer and pure epoxy are not applied to the wooden floor.

8. MARKINGS

8.1 Lettering

The markings will be designed decal and arranged according to buyer's requirement. The markings consist of the following contents:

- 1) Owner's emblems according to owner's design.
- 2) Owner's code , serial number and check digit (outside & inside)
- 3) Size and type code (outside)
- 4) Weight details (on door)
- 5) Other marking: According to owner's requirements. 6) Material of marking : vinyl decal film .

8.2 Consolidate Plating

8.2.1 The containers will bear marking plate in accordance with the requirements of the Classification Authorities and owner such as mentioned in section 2.2 in this specification.

Plate material : Stainless steel

Rivets material : Stainless steel

8.2.2 Contents of the Plate:

- 1) Owner's plate (name and address) .
- 2) CSC approval No.
- 3) Customs approval No.
- 4) Australian wood treatment .

The engraved letters on this plate are as following :

IM : Immunization

XXXX : The name of preservative.

XXXX : The time of immunization.

- 5) Date of manufacture (year-engraved, month-stamped) 6) Factory serial number (stamped) 7) Factory model number.

9. TESTING AND INSPECTION

9.1 Proto-type Container

Proto-type container to be manufactured in accordance with this specification and shall be tested according to procedures described in the ISO 1496/1. and the Classification Society's requirements.

9.2 Container in Mass Production

9.2.1 Every container in mass production shall be manufactured under effective quality control procedures to meet the specified standards.

One of every 200 of containers shall be tested for following items:

- a) Stacking test
- b) Lifting from top corner fitting test
- c) Lifting from bottom corner fitting test
- d) Floor test.

After completion, all the containers shall be subject to dimension check, door operation check, light leakage test & production type weather-proofness test. The containers shall be inspected by the surveyor of Classification Society and identified by the appropriate society seal.

9.3 The proposed criteria table for general prototype testing:

Test No.	Test Load	Method
a. Stacking	Internal Load: 1.8R-T Testing load: 97,200 kg / Post	Hydraulic cylinder load to corner post through top corner fittings. Time duration: 5 mins .
b. Lifting From Top Corner Fittings	Internal Load: 2R- T	Lifting vertically from top corner fittings. Time duration: 5 mins .
c. Lifting From Bottom Corner Fittings	Internal Load: 2R- T	Lifting from bottom corner fitting 45 deg. to horizontal Time duration: 5 mins .
d. Lifting from Fork Pocket	Internal Load: 1.6R-T	Lifted by horizontal bars. Bar length : 1828 mm, Bar width : 200 mm, Time duration : 5 mins .
e. Restraint (Longitudinal)	Testing Load: 2R(R/ side) Internal Load: R-T	Hydraulic cylinder load applied to bottom side rails in compression & then tension. Time duration: 5 mins .
f. Floor Strength	Truck Load: 6,000 kg	Total contact area: 284 sq.cm, Wheel width: 180 mm, Wheel center distance: 760 mm

g. Wall Strength (Front & Door)	Test Load: 0.4 P	Compressed air bag is used. Time duration: 5 mins.
h. Side Wall Strength	Test Load: 0.6 P	Compressed air bag is used. Time duration: 5 mins.
i. Roof Strength	Test Load: 300 kg	Applied area will be the weakest place of 600 x 300 mm. Time duration: 5 mins.
j. Rigidity (Transverse)	Test Force: 15,240 kg (150 kn)	Hydraulic cylinder will be applied to front top end rail & door header through top corner fittings, each time pulling & pushing. Time duration: 5 mins.
k. Rigidity (Longitudinal)	Test Force: 7,620 kg/Rail (75 kn/Rail)	Hydraulic cylinder load will applied to side top rail through top corner fittings. Time duration : 5 mins .
m. Weather proofness	Nozzle: 12.5 mm (inside dia.) Pressure :100 Kpa(1 kg/sq.cm)	Speed : 100 mm/Sec. Distance : 1.5 m