

Rainbow Containers GmbH

## TECHNICAL SPECIFICATION

FOR

20' X 8' X 8'6" ISO 1CC TYPE  
STEEL DRY CARGO CONTAINER

WITH

ALL CORTEN

WITH

CORRUGATED DOOR  
CORRUGATED ROOF  
1 PAIR OF FORKLIFT POCKET  
2 VENTILATORS  
PLYWOOD FLOOR

FOR

**Rainbow Containers GmbH - Hamburg**

SPECIFICATION NO.: SP-SNRT-02(M)  
MODEL NO. : SP-SNRT-02(M)

# SCOPE

This specification covers the design, construction, materials, testing, inspection and performance requirements for ISO, 1CC type steel dry cargo containers.

The containers specified herein are manufactured under the quality control within the perimeters as such set forth by the Classification Societies.

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## 1. GENERAL

### 1.1. Operational Environment

The container is designed and manufactured for the carriage of general cargo by marine, road, and rail. It is designed to maintain its structural and weathertight integrity within a temperature range of -30 degree C to 80 degree C.

### 1.2. Regulations and Standards

The container will conform to and satisfy the following regulations and standards.

#### 1.2.1 ISO/TC-104

All to meet series 1 freight containers set forth.

ISO 830-1981/A1-1984(E/F/R)	Freight containers-Terminology.
ISO 668:1988/Amd.1:1993(E)	Series 1 freight containers- Classification, external dimensions and ratings.
ISO 6346:1984/A1:1995(E)	Freight containers-Coding, identification and marking.
ISO 1161-1984(E)	Series 1 freight containers-Corner fittings-specification.
ISO 1496-1:1990/Amd.1:1993	Series 1 freight containers-Specification and testing- Part 1 : General cargo containers

#### 1.2.2 T.I.R. Requirements and Certifications

The container shall comply with the customs convention of containers, 1972 and all subsequent revisions to date and will be identified with appropriate approval plates and markings.

#### 1.2.3 Timber Component Treatment and Certification

All exposed timber components are treated with an Australian government approved insecticide and the container will be such identified with appropriate immunization plate.

#### 1.2.4 U.I.C. Registration

The container will be registered and comply with the International Union of Railways (UIC) code 592-1 OR and 592-2 OR.

#### 1.2.5 CSC Requirements

The container will comply with the rules set forth in the International Convention for Safe Containers and will be so identified with a plate.

#### 1.2.6 Classification Society

The container will be certified by classification society in design and individually during its production.

#### 1.3. Handling

The container will be constructed to be handled under the following conditions without distortion or effect on its structural integrity:

- A. Lifting full by its top corner fittings by means of spreaders
- B. Lifting full by its bottom corner fittings by means of fitting at a sling angle of 45 degrees.
- C. Lifting full or empty by forklift at its forklift pocket.

#### 1.4. Transportation

The container will be constructed to be suitable for transportation in normal operating conditions by modes of:

- A. Marine - on deck or in cell guided by vertical or diagonal lashings
- B. Rail - on flat or container car secured at its bottom corner fittings
- C. Road - on flat or chassis secured at its bottom corner fittings

## **2. DIMENSIONS AND RATINGS**

### 2.1 External Dimensions

Length: 6,058 MM 0 -6  
Width: 2,438 MM 0 -5  
Height: 2,591 MM 0 -5

### 2.2 Internal Dimensions

Length: 5,898 MM 0 -6  
Width: 2,352 MM 0 -5  
Height: 2,395 MM 0 -5

### 2.3 Diagonal Difference

Diagonal tolerance of front and rear frames should be less than 10 MM  
Diagonal tolerance of side and roof panels should be less than 13 MM

### 2.4 Internal Capacity

33.2 CU.M. (1,173 CU.FT.)

### 2.5 Door Opening

Width: 2,343 MM 0 -5  
Height: 2,280 MM 0 -5

### 2.6 Ratings

Max. Gross Wt.: 30,480 KGS (67,200 LBS)  
Max. Payload: 28,295 KGS (62,380 LBS)  
Tare Wt. +/-2%: 2,185 KGS ( 4,820 LBS)

### 2.7 Corner Protrusions

- 2.7.1 The faces of the bottom corner fittings protrude from lower faces of all transverse members in the base of the container by 14.5 MM (+3,-3.5 MM).
- 2.7.2 The upper faces of top corner fittings protrude from upper faces of the highest point of the roof by 6 MM.
- 2.7.3 The outer side faces of corner fittings protrude from outside faces of corner posts by 3MM.
- 2.7.4. Under 1.8 x max. gross weight no part of the base will protrude more than 6 MM below the bottom corner fittings.

### **3. MATERIAL AND CONSTRUCTION**

#### **3.1. General**

The container is mainly constructed with steel frames, corrugated panels welded by CO<sub>2</sub> shielded Arc welding. All welds of the exterior including the base frames are continuous with full penetration. Wooden floor is fixed to the cross members by self-tapping screws. All crevices will be sealed with elastic sealing compound.

#### **3.2. Materials**

The main constructional materials are shown in Appendix A of the specification.

#### **3.3. Corner Fittings**

All corner fittings used will comply with ISO/1161 standard.

#### **3.4. Base Structure**

3.4.1 The bottom side rails are of 158x48x30x4.5 MM thick channel section steels with a pressed profile as shown in drawing attached.

3.4.2 The cross members consist of 16 pcs of 122x45x45x4 MM thick steel channel and 2 pcs of 122x80x45x4 MM thick members at the floor joints spaced at no more than 340 MM centers.

3.4.3 Each forklift pocket is of 2 pcs of cross members welded with a 3 MM thick top plate and 2 bottom end plates 200 MM deep x 6 MM thick. The piece located beneath the floor board joints is of 122x80x45x4 MM thick.

3.4.4 Four corner gussets, 4.0x200 MM thick protection plates will be welded from side rail to corner fittings.

#### **3.5. Floor**

3.5.1 The floor is of 28 MM thick plywood. All joints between each plywood and the whole floor perimeter are sealed with an elastic sealant.

3.5.2 The plywood used will be 19 plies and will be:

- A. Hardwood of a specific gravity range of 0.7-0.85 at a moisture content of 12%. E.G. Keruing, Apitong.
- B. Moisture content will be 13-15% when fitted to the container.

3.5.3 The plywood used will be certified to meet the requirements of Australian Commonwealth Dept. of Health (Plant Quarantine Treatment Schedule) for Timber Components ( T.C.T.).

3.5.4 The floor will be fixed to the steel cross members by zinc-plated self-tapping screws. The head of these screws are countersunk below the level of the upper surface of the floor by 2 MM to 2.5 MM.

3.5.5 The floor spacer with t4.0x50 MM flat bar will run the full length in center.

### 3.6. The Front Frame

3.6.1 The bottom end rail is pressed steel and formed into open sections. The bottom end rail has 4 pcs of 4.5 MM thick inner vertical gussets located equidistantly as the gussets of the door sill..

3.6.2 Each front corner post is a single pressed section of 6 MM steel.

3.6.3 The top front rail is a upper plate of 3 MM thick and a 60x60x3 MM thick square tube forming its profile.

3.6.4 The front panel is of 2 pcs of corrugated 2 MM steel panel.

### 3.7. The Rear Frame

3.7.1 The door sill (rear bottom rail) is pressed steel and formed into open sections. Each door sill has 4 pcs of 4.5 MM thick inner vertical gussets located just behind the cams of the door locking assembly.

3.7.2 The rear corner post is a single piece of pressed section of 4.5 MM thick reinforced on the inside with a 113x40x12 MM channel.

3.7.3 The door header has a 3 MM thick top plate with a 4 MM "U" channel at the bottom forming into a box shape.

### 3.8 Side Walls

3.8.1 The side walls are of 5 pcs of 2.0 MM thick steel panels of both ends and 1.6 MM thick intermediate steel panels without marking panels, vertically trapezium corrugated steel panels continuously welded to each other and to the end rails and corner posts. Welding penetration side panels to rails should be min. 75%.

3.8.2 The top side rails are 60x60x3 MM steel square tube.

### 3.9 Roof

3.9.1 The roof is of 5 pcs corrugated 2 MM steel panels with a 5 MM camber continuously welded to the upper frame.

### 3.10 Door

- 3.10.1 The doors are constructed with corrugated steel panels. The panel thickness is 2 MM. The top and bottom horizontal door members are pressed 'U' type members.
- 3.10.2 Each door is capable of swinging 270 degrees when fully opened and can be secured in that position by means of nylon ropes attached.
- 3.10.3 The right door is so designed that the right door must be opened before the left in compliance with T.I.R. requirements.
- 3.10.4 The door gasket is of extruded EPDM with a double lip to ensure water tightness. The upper and side gaskets are of 'J' type configuration. Bottom is of a 'C' type configuration. It is attached with sealant and secured with a stainless steel retainers by blind rivets.
- 3.10.5 Each door is suspended by four hinges with stainless steel pins, nylon bushings and brass washers placed at the hinge pin lugs of the rear corner posts.
- 5.3.2 Galvanized locking devices on a galvanized 34 MM dia. pipe are secured to the door with nuts and bolts and has nylon bushings on the brackets. The Locking devices will be installed after the container is painted.
- 3.10.7 A door holder per door, made of mixed nylon rope, is tied to the center-side locking rod and the receptacle (hook type) is welded to each bottom side rail to retain the door at the open position.

### 3.11. Sealant

Butyl based sealant is to be used for non-exposed parts such as floor lap joint area and between door gasket and frame. For internal exposed parts such as the periphery of the floor and inside seam line between panels and frame work, chloroprene sealant is to be used.

### 3.12 Special Features

- 3.12.1 Shoring Slots: 61.5x40 MM slots are provided for on each of the corner posts so that a 2" thick batten can be secured to give protection against shifting cargo.
- 3.12.2 Lashing Rings: 4 rings with 12 MM dia. will be welded to each of the bottom and top side rails. These rings shall have a capacity of 1,500 KGS. 2 lashing bars will be welded to each corner post.
- 3.12.3 Ventilators - ventilators should be small type fabricated from A.B.S. resin by injection molding process. They will be secured to the second corrugation recess from right corner post of both side walls, by means of blind rivets.
- 3.12.4 Two pcs of 200x75x9.0 MM thick cone damage protectors ( U channels) are placed at both sides of front end rail as well as door sill.
- 3.12.5 Reinforcement plates - the 300x270x3 MM steel plate are welded to the upper surface of the top end frames around the top corner fittings.



### 3.12.6 Customs Seal Provision

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

## 4. SURFACE PROTECTION

### 4.1. Surface Preparation

All steel components, prior to forming, will be shot-blasted to a SA 2.5 standard surface by means of an automatic centrifugal shot surface cleaning machine. A weld-able primer compatible to the paint system will be applied immediately to a thickness of 10 micron to preserve the surface integrity during the assembly process. After the container is assembled it is shot-blasted again manually to clean all the welds and any other area that was contaminated during the assembly process. Slags and spatters are removed by means of grinding or needle hammers.

### 4.2 Paint (Supplier: HEMPEL)

*Exterior: Color: RAL 5010 Blue*

Apply one coat of zinc rich primer to 30 mic. DFT.

Apply one coat of epoxy primer to 40 mic. DFT.

Apply one coat of chlorinated rubber top coat to 40 mic. DFT.

Total 110 mic. DFT.

*Interior: Color: RAL 7035 Grey*

Apply one coat of zinc rich primer to 25 mic. DFT.

Apply one coat of epoxy top coat to 50 mic. DFT.

Total 75 mic. DFT.

### 4.3. Undercoating

The whole underside will be coated with 25 mic. of zinc rich primer and 180 mic. of Waxy or Bituminous undercoating.

Total 205 mic. DFT.

## **5. MARKING**

### 5.1 Lettering

The container will be marked in accordance with ISO requirements, owner's specifications, and other regulatory authorities.

### 5.2. Materials

The decals are of a self adhesive type and are warranted for seven (7) years against normal wear and tear. All data plates will be stainless steel and secured by steel blind rivets and sealed with silicon sealant.

### 5.3 Plating and Stamping

5.3.1 Owner's and manufacturer's serial number will be stamped into the inside right rear corner post at eye level.

5.3.2 Chemically etched stainless steel plates ( Consolidated data plate i.e. TIR, CSC, TCT ).will be permanently riveted with steel blind rivets and sealant will be applied around these plates.

## **6. TESTING AND INSPECTION**

### 6.1. Materials and Parts Inspection

All materials and parts are inspected by the manufacturer's Quality Control department to ensure they are up to the specification called for in the design.

### 6.2. Prototype Container

A prototype container manufactured in accordance to this specification will be tested and certified by the Classification Societies in accordance to their requirements for prototype testing. These tests will be conducted in the presence of the classification society's surveyors.

### 6.3. Production Line Quality Control

All containers are manufactured under effective quality control procedures to meet the specified standards. All dimensions are checked and smooth operation of the doors are ensured after each container's completion. A light and watertight test is conducted on all containers.

Quality control personnel independent of the production dept. will be inspecting on all phases of the production as well as ad hoc inspections by the classification society's surveyor and buyer's representatives to assure the quality of the container.

## **7. WARRANTY**

### 7.1. Guarantee

The guarantee period will commence the day after the certification is issued by the classification society.

### 7.2. Paint Guarantee

The application of paint will be guaranteed against corrosion and paint failure for a period of five (5) years. The guarantee is for all faults affecting more than 10% of the painted surfaces and will assure partial or total re-painting of the containers. Normal wear/tear, or corrosion caused by acid, alkali or results of damages by abrasion, impact or accident are excluded.

Note: Corrosion is defined as rusting which exceeds RE3 (European scale of degree of rusting) on at least ten (10) percent of the total container surface coated with the concerned coating system.

### 7.3. Other Guarantee

7.3.1 This container will be guaranteed against any defects or omissions in constructions, workmanship and materials for a period of two (2) year. In the event of defects, factory will replace, correct or install to make the container satisfactory to this specification and its intended service at factory's expense. Any damages caused by mis-handling, mis-securing, mis-loading, impact and any natures of accidents are excluded.

### 7.4. Welding

7.4.1 The welding between the corner posts and the rails shall be continuous single welding.

7.4.2 The external welding between the corner posts and the front/side panels shall be continuous welding and the internal welding shall be as follows:

The continuous welding shall be 150 MM from the top and 150 MM from the bottom. The intermediate "tack welding" shall be 30 MM in every 300 MM and sealant shall be applied between the welding beads.

7.4.3 Welding penetration at connection point between side/front panels and frame of the container should be min. 75%.

### 7.5 Buyer's Q.C. Inspection

7.5.1 Container production shall be attended by buyer and/or a duly designated inspector. The party or parties concerned shall have authority to provide directives concerning the production and quality thereof.

7.5.2 Any cost which are resulted from poor production necessitating the intervention and/or re-inspection by buyer or its appointed inspector shall be borne by factory.

## **8. DOCUMENTS**

The following documents are to be submitted to the buyer:

- 1) Copy of the proto-type test report as certified by the Classification Societies.
- 2) Copy of the type approval certificate.

When contraction, factory will submit the following data in triplicate:

- 1) General arrangement drawing showing construction, materials, and dimensions.
- 2) Final specification.

## APPENDIX A

Material list for main steel parts:

YP = YIELD POINT (KG/MM<sup>2</sup>)

E = ELONGATION %

TS = TENSILE STRENGTH (KG/MM<sup>2</sup>)

FRONT PANEL	)	SPA-H OR EQUIVALENT
FRONT TOP RAIL	)	
FRONT CORNER POST	)	
FRONT BOTTOM RAIL	)	
REAR CORNER POST-OUTER	)	
DOOR PANEL	)	
DOOR HEADER	)	
DOOR RAIL	)	
DOOR EDGE MEMBER	)	
DOOR SILL	)	
SIDE PANEL	)	
TOP SIDE RAIL	)	
BOTTOM SIDE RAIL	)	
ROOF PANEL	)	
CROSS MEMBER	)	
REINFORCEMENT PLATE	)	
FORK LIFT POCKET	)	
FLOOR SPACER	)	
DOOR SEAL RETAINER	)	STAINLESS
CONE DAMAGE PROTECTOR	)	JIS: SS41 HOT ROLLED SHAPED STEEL YP=24 TS=41 E=21
REAR CORNER POST-INNER	)	JIS: SM50YA HOT-ROLLED HI-TENSILE SHAPED STEEL YP=35 TS=56 E=26
LOCKING BAR	)	JIS: STK41 YP=24 TS=41 E=23
CORNER FITTING	)	JIS: SCW49 MOD. WELDABLE

CASTING  
YP=29 TS=49 E=25

DOOR HINGE ) JIS: S25C FORGING STEEL  
YP=23 TS=44 E=20

DOOR LOCKING CAM ) JIS: S20C FORGING STEEL  
AND KEEPER ) YP=23 TS=44 E=19

## APPENDIX B

### TESTING ITEMS, LOADS AND CRITERIA

NOTE: Figures in brackets of R: Gross Weight 30,480 KG  
"residual deformation" P: Payload 28,295 KG  
column show the total T: Tare Weight 2,185 KG  
residual deformation \* Measured from the plane of  
after completion of the bottom corner fittings.  
series tests 1, 2A, 2B, \*\* Elastic Deformation  
2C, 3, and 6 \*\*\* Dimensions within ISO tolerance

Test Load	Permissible Criteria		
		Deflection under Load	Residual Deformation
1. Stacking			
848 KN (86,400 KG) per post	Corner Posts	** 4MM	2MM
	Bottom Side	4MM	
Offset: 25MM laterally	Rails		
38MM longitudinally	Cross Members	*6MM	3MM
(1.8R-T) loaded on floor			
2.A. Lifting from the four top corner fittings			
(2R), vertically	Bottom Side	4MM	
(2R-T), loaded on floor	Rails		
	Cross Members	*6MM	3MM
2.B. Lifting from the four bottom corner fittings			
(2R), lifting	Bottom Side	4MM	
forces 45 angle	Rails		
(2R-T), Loaded on floor	Cross Members	* 6MM	3MM

2.C.	Lifting from fork pockets			
	(1.6R): (1.6R-T):loaded on floor	Bottom Side Rails	* 6MM	3MM
3.	Restraint			
	(2R), per rail, compression and tension longitudinally, (R-T) loaded on floor	Bottom Side Rails		
		Vertically	3MM	
		Longitudinally	2MM	
4.	Strength of End Walls			
	(0.4P) uniformly	Front End Panel Door Panel	8MM 5MM	
5.	Strength of Side Walls			
	(0.6P) uniformly	Side Panel Top & Bottom Side Rails	10MM 4MM	
6.	Floor Strength			
	7,260 KG, axle weight 3,630 KG per wheel	Cross Members	3MM	
7.	Strength of the Roof			
	300 KG, distributed over an area of 300MM x 600MM	Roof Panel	5MM	
8.A.	Rigidity (Transverse)			
	15,240 KG, horizontally, push and pull (diagonal)	End Frame	** 60MM	10MM
8.B.	Rigidity (Longitudinal)			
	7,620 KG, horizontally, push and pull at Top Fittings)	Side Frame	** 25MM	7MM
9.	Weatherproofness			

By Spray Rack System: 0.5 hour min.

Nozzle Pressure: 1 KG / CM<sup>2</sup>

Nozzle Diameter: 12.5 MM

Distance from Container

Surface to Nozzle: 1.5 M

Remove Speed: 100 MM/SEC.