

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

SPECIFICATION NO.: SP-STDF-20
MODEL NO.: SP-STDT-02(F)
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SCOPE

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

The containers specified herein are manufactured under the quality control of factory 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 °C to 80 °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 ----- Freight containers-Terminology.

ISO 668 ----- Series 1 freight containers-Classification, external dimensions and ratings.

ISO 6346 ----- Freight containers-Coding, identification and marking.

ISO 1161 ----- Series 1 freight containers-Corner fittings-specification.

ISO 1496-1 ----- 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 Dimension**

Title		20'
External (mm)	Length	6,058 (0, -6)
	Width	2,438 (0, -5)
	Height	2,591 (0, -5)
Internal (mm)	Length	5,898 (0, -6)
	Width	2,352 (0, -5)
	Height	2,393 (0, -5)
Door opening (mm)	Width	2,343 (0, -5)
	Height	2,280 (0, -5)

2.2 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.

2.3 Internal Capacity

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

2.4 Ratings

Title	KGS	LBS
Max. Gross Weight	30,480	67,200
Tare Weight	2,185	4,820
Max. Payload	28,295	62,380

2.5 Corner Protrusions

- 2.5.1 The faces of the bottom corner fittings protrude from lower faces of all transverse members in the base of the container by 17 MM (+0.5, -6.0 MM).
- 2.5.2 The upper faces of top corner fittings protrude from upper faces of the highest point of the roof by 6 MM.
- 2.5.3 The outer side faces of corner fittings protrude from outside faces of corner posts by 3 MM.
- 2.5.4 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 CO₂ 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

The base structure will be composed of two (2) bottom side rails, a number of crossmembers and one pair of forklift pockets, which are welded together as a sub-assembly.

3.4.1 Bottom Side Rail

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

Qty. : 2 pcs
Shape : Channel section
Dimension : 158 x 50 x 30 x 4.5 mm

3.4.2 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, which are placed at certain center distance. There are 3 pcs of t4.0 stiffeners in each joint member.

Shape :	"C" section	
Small one :	122 x 45 x 45 x 4.0 mm	Qty. : 16 pcs.
Large one :	122 x 75 x 45 x 4.0 mm	Qty. : 2 pcs.
Stiffener :	4.0 mm thick	Qty. : 6 pcs.

3.4.3 Forklift Pocket

There will be a pair of forklift pocket in every container. Each forklift pocket consists of 2 pcs of cross members, one piece of top plate and 2 pcs of bottom end plates. Each forklift pocket is designed according to ISO standard :

Top plate :	3 mm thick	Qty. : one piece.
Bottom end plate :	6.0 mm thick	Qty. : 2 pcs.
Cross member :	122 x 45 x 45 x 4.0 mm	Qty. : (2) pcs.

3.4.4 Floor central rail

A 4.0 x 50 mm flat bar loosely placed on top of the crossmembers to support the floorboards at the center.

3.4.5 Floor retainer

A number of 25 x 25 x 2.3 mm thick angle steel will be placed on the side of the bottom side rails or the crossmembers to support the floorboards.

3.4.6 Base Gusset

Four corner gussets, these protection plates will be welded from side rail to corner fittings.
Dimension : 200 x 146 x 4.0 mm

3.5 Front End

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

3.5.1 Front End Frame

The front end frame will be composed of two corner posts, one top end rail (sub-assembly), one bottom end rail and four corner fittings.

3.5.1.1 Front 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.

3.5.1.2 Top End Rail (sub-assembly)

The front top end rail is constructed with steel square tube lower part and steel plate upper part. The upper part is extended inwards of the container certain distance with full width from front part of top corner fittings.

Lower rail : 60 x 60 x 3.0 mm
Upper part : 3.0 mm thick

3.5.1.3 Bottom end rail

The bottom end rail is of 4.0 mm pressed steel and formed into open sections. The bottom end rail has 4 pcs inner vertical gussets. Two channel section steel recesses are provided adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Gusset thickness : 4.0 mm
Channel section : 200 x 75 x 9.0 mm
Bottom end rail : 40 x 32 x 60 x 154 x 40 x 4.0 mm

3.5.2 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.

Front end wall thickness: 2.0mm
Corrugation dimension – Depth : 45.6 mm
Outerface : 110 mm
Interface : 104 mm
Slope : 18 mm
Pitch : 250 mm

3.6 The Rear Frame

The rear frame consists out of one door header, one door sill, four corner fittings and two corner posts.

3.6.1 Rear Corner Post

Each corner post is constructed from an inner part of channel shaped hot-rolled section steel and an outer part of steel pressing, welded together to form a hollow section to ensure the door opening and 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 : 4.5 mm thick

3.6.2 Door Header

The door header is constructed from a lower part of a "U" shaped steel pressing with internal stiffener ribs at the location of the back of cam keeper 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 thick
Header plate : 3.0 mm thick
Rib : 4.0 mm thick Qty. : 4 pcs.

3.6.3 Door Sill

The door sill is built of a special channel section steel pressing with internal ribs as 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 adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Door sill : 4.5 mm thick, Slope : 10 mm
Stiffener ribs : 4.0 mm thick Qty. : 4 pcs.
Channel section : 200 x 75 x 9.0 mm

3.7 Side Wall Assembly

The side walls will be continuously welded to each other and to the end rails and corner posts. Welding penetration side panels to rails should be min.75%.

3.7.1 Top Side Rails

Each top side rail is used a square steel pipe. Rail : 60 x 60 x 3.0 mm

3.7.2 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.

Trapezium – Depth : 36 mm
Outerface : 72 mm
Interface : 70 mm
Slope : 68 mm
Pitch : 278 mm

a) Inner panel : 1.6 mm thick Qty. : 3 pcs / each side.
b) Outer panel : 2.0 mm thick Qty. : 2 pcs / each side.

3.8 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
Outerface : 91 mm
Interface : 91 mm
Slope : 13.5 mm
Pitch : 209 mm

Camber upwards : 5 mm
Panel thickness : 2.0 mm
Sheet Qty. : 5 pcs

3.8.1 Roof Reinforcement Plate

Four reinforcement plates shall be mounted around the four corner fittings.
Dimension : 300 x 270 x 3.0 mm

3.9 Door

The door consists of two door leaves, each leaf with two locking devices, four hinges, seal gaskets and door holders.

3.9.1 Door Leaf

Each leaf consists of door panel, steel door frame which consists of vertical (inner & outer) and horizontal (upper & lower) members. They are welded together to form the rectangular door leaf.

3.9.1.1 Door panel : With 5 corrugations.

Panel thickness : 2.0 mm
Depth : 36 mm
Interface : 70 mm
Slope : 68 mm

3.9.1.2 Door frame : a) Vertical door member : 100 x 50 x 3.2 mm (inner & outer) b) Horizontal door member : Channel section, 150 x 50 x 3.0 mm.

3.9.1.3 Each door is capable of swinging 270 degrees when fully opened and can be secured in that position by means of nylon ropes attached.

3.9.1.4 The right door is so designed that the right door must be opened before the left in compliance with T.I.R. requirements.

3.9.2 Door gasket

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.

3.9.3 Hinges and Pins

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.

3.9.4 Locking Devices

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.

3.9.5 Door Holder and Receptacle

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.

3.10 Floor

3.10.1 The Floor Boards

The floor consists of plywood. 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.). The floor dimension should according to the IICL dimension standard. The plywood thickness is 28 mm.

3.10.2 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 and two angle steel along both side rails. 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 2.0 mm to 2.5 mm.

Screws : M8 x 45 x \varnothing 16(Head) mm

Screws' Qty. : 5 pcs / end row and joint , 4 pcs / other

3.10.2 The plywood used will be a minimum 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, Birch.
- B. Moisture content will be 13-15% when fitted to the container.

3.11. Sealing

1. Each perimeter of the floor;
2. All the overlapped joints of inside;
3. All the holes for bolts and nuts;
4. Three sides of CSC plate and ventilators;
5. Between door gasket and door panel at 305 mm above lower gasket;
6. All the places where may leak water will be sealed to give prevention against water entry.

Note: The application of interior sealant will be put on after water testing.

Sealant Materials : a. Chloroprene (Cargo contact area)
b. Butyl (Hidden parts)

3.12 Special Features

- 3.12.1 Shoring Slots: 60x40 MM slots are provided for on each of the rear corner posts so that a 2" thick batten can be secured to give protection against shifting cargo.

3.12.2 Lashing Rings and Lashing Bars

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

Lashing ring Qty. / each bottom or top side rail : 5 pcs , total : 20 pcs.

2) Lashing bars are welded on each front & rear corner post slot.

Lashing bars Qty. / each front & rear corner post : 2 pcs, total : 8 pcs.

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

Lashing rings on the side rails : 1,500 kg / each

3.12.3 Ventilators – Two (2) 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 three (3) Aluminum Huck bolts.

3.12.4 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

Exterior:

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 or Acrylic top coat to **40** mic. DFT.

Total **110** mic. DFT.

Interior:

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 **200** mic. of Waxy or Bituminous undercoating.

Total **225** 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 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. 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

This container will be guaranteed against any defects or omissions in constructions, workmanship and materials for a period of one (1) 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.

APPENDIX A
Material list for main steel parts

YP = YIELD POINT (KG/MM²)

E = ELONGATION %

TS = TENSILE STRENGTH (KG/MM²)

FRONT PANEL	SPA-H OR EQUIVALENT
FRONT TOP RAIL	YP=35 TS=49 E=22
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=25 TS=41 E=21
REAR CORNER POST-INNER	JIS: SM50YA HOT-ROLLED HI-TENSILE SHAPED STEEL YP=37 TS=50 E=15
LOCKING BAR	JIS: STK41 YP=23 TS=41 E=23
CORNER FITTING	JIS: SCW49 MOD. WELDABLE CASTING YP=28 TS=49 E=20
DOOR HINGE	JIS: S25C FORGING STEEL YP=23 TS=44 E=20
DOOR LOCKING CAM AND KEEPER	JIS: S20C FORGING STEEL YP=23 TS=44 E=19

APPENDIX B
TESTING ITEMS, LOADS AND CRITERIA

NOTE: Figures in brackets of "residual deformation" column show the total residual deformation after completion of the series tests 1, 2A, 2B, 2C, 3, and 6

R: Gross Weight 30,480 KG
P: Payload 28,295 KG
T: Tare Weight 2,185 KG

*Measured from the plane of bottom corner fittings.

**Elastic Deformation

***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 forces 45 angle	Bottom Side	4MM	
(2R-T), Loaded on floor	Rails		
	Cross Members	*6MM	3MM
2.C. Lifting from fork pockets			
(1.6R):	Bottom Side	*6MM	3MM
(1.6R-T):loaded on floor	Rails		
3. Restraint			
(2R), per rail, compression and tension longitudinally,	Bottom Side Rails		
(R-T) loaded on floor	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	End Frame (diagonal)	** 60MM	10MM
8.B.	Rigidity (Longitudinal)			
	7,620 KG, horizontally, push and pull	Side Frame (at Top Fittings)	** 25MM	7MM
9.	Weatherproofness			
	By Spray Rack System: Nozzle Pressure: Nozzle Diameter:	0.5 hour min. 1 KG / CM ² 12.5 MM		
	Distance from Container Surface to Nozzle: Remove Speed:	1.5 M 100 MM/SEC.		
10.	One Door Off Test:			
	Stacking test: Racking test: End wall test:	27,450kg/post. 7,500kg 5,650kg		