TECHNICAL SPECIFICATION

FOR

STEEL DRY CARGO CONTAINER

20' x 8' x 8'6" ISO 1CC TYPE

MODEL NO	**: PL08-20OWC**
SPEC. NO	**: PL08-20OWC –S**
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I N D E X

1. General

1.1 Scope

This specification will cover the design, construction, materials, testing and inspection performances of 20' x 8' x 8'6" ISO 1CC type steel dry cargo containers.

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.

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 (1CC type)

ISO 668	--	Series 1 freight containers - Classification external dimensions and ratings [Amd. 1993 (E)]
ISO 830	--	Terminology in relation to freight container (Amd. 1988)
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 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 *U.I.C. Registration*

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

1.3.6 *Classification society*

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

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

1.4 *Handling*

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

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

b) Lifting, full or em pty, at bottom corner fittings using slings with term inal 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, seven (7) 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	6,058	+ 0mm - 6mm	19'	10 1/2"	+0 -1/4"
Width	2,438	+ 0mm - 5mm	8'	+0	-3/16"
Height	2,591	+ 0mm - 5mm	8'	6" +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 any one 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	5,900 + 0mm - 6mm		19' 4 9/32" +0	-1/4"
Width	2,352 + 0mm - 5mm		7' 8 19/32" +0	-3/16"
Height	2,393 + 0mm - 5mm		7'10 7/32" +0	-3/16"

2.3 *Door opening dimensions*

Width	2,340 + 0mm - 5mm		7' 8 1/8" +0		-3/16"
Height	2,280	+ 0mm - 5mm	7'	5 49/64"	+0 -3/16"

2.4 *Internal cubic capacity (Nominal)*

33.2 cu.m 1,170 cu.ft

2.5 *Forklift pockets*

Width	360 mm	1'	2 11/64"	
Height min.	115 mm		4 1/2"	
Centre to centre	2,080 mm	+20/- 80mm	6' 9 57/64	+25/32"/ -3 5/32"

2.6 *Ratings*

Max. Gross Weight (R)	30,480 kgs	67,200 lbs
Tare Weight (design) (T)	2,200 kgs	4,850 lbs
Max. Payload (P)	28,280 kgs	62,350 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 by JIS***
1)	Roof panels Door panels Side panels Front panels Cross members Bottom side rails Top side rails Door sill Door header (upper & lower) Front top end rail Front bottom end rail Upper & lower plates of forklift pockets Door horizontal frames Door vertical frames Front corner posts Rear corner posts (outer) Floor centre rail	Anti-Corrosive Steel: CORTEN A, SPA-H, B480 or equivalent Y.P. : 35 kg/sq. mm T.S. : 49 kg/sq. mm
2)	Rear corner posts (inner)	Rolled high tensile steel: SM490A or equivalent Y.P. : 33 kg/sq. mm T.S. : 50 kg/sq. mm
3)	Door locking bars	Structural steel round pipe: STK41 Y.P. : 24 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	Stainless steel: SUS304
7)	Door gasket	EPDM
8)	Floor board	Hardwood plywood, min.19-ply
9)	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 and front wall, horizontal-corrugated steel double doors at rear end, die-stamped steel roof and corner fittings.

4.1.2 All welds of exterior including the base frames will be continuous welding using CO_2 gas, 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 and 4mm for front end structure.

4.2.4 The outside faces of the corner fittings will protrude from side wall by nominal 8mm and from the outside face of the end wall by 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 eighteen (18) cross members.

4.4.1 *Bottom side rail*

Each bottom side rail is built of 50x30x155x30x 4.0mm thick cold-formed channel section steel made in one piece. The lower flange of the botto m side rail is outward so as to facilitate easy removal of the cross members during repair and of less susceptible corrosion.
Reinforcement plates are to be made of 4.0mm thick angle section steels. The angle steels are welded to bottom corner fitting.

4.4.2 *Forklift pockets*

Each forklift pocket is built of 3.0mm thick full depth flat steel top plate and two 200 mm deep x 6.0 mm thick flat lower end plates between two channel section cross members.
The one set of forklift pockets is designed in accordance with ISO requirements.

4.4.3 *Cross member*

The cross members are made of pressed channel section steel with a dim ension of 45x122x45x3.5mm for the norm al areas and 75x122x45x 4.0mm for the floor butt joints. The cross members are placed fully to withstand floor strength and welded to each bottom side rail. Three (3) pieces of 4.0mm gussets to be fully welded at one inside of floor joint cross-member.

4.5 *Flooring*

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

4.5.1 *Floor*

The wooden floor to be constructed with 28mm thick m in.19-ply hardwood ply wood boards which is the first three lay ers on top/bottom the grain should be in longitudinal direction are laid longitudinally on the transverse members and floor centre rail of 4.0mm thick flat bar. The floorboards are tightly secured to each transverse m ember by self-tapping screws, and all butt joint areas and peripheries of the floorboards are caulked with sealant.

1) Wood species : Apitong or Tropical combination hardwood plywood.
2) Glue : Phenol-formaldehyde resin.
3) Treatment :
   a) Preservative: MEGANIUM 2000 or others.
   b) In accordance with Australian Health Departm ent 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 16m m dia. head x 45mm length, and fastened by four screws per cross member b ut five screws at joint areas. Screw heads are to be countersunk through about 2m m below the floor top surface.

4.6 *Rear frame structure*

The rear fram e will be com posed 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 a 4.5mm thick pressed open section steel is reinforced by four internal gussets of a 4.0mm thick at the back of each locking cam keeper location. The upper face of the door sill has a 10mm slope for better drainage.
A 200 x 75mm section is cut out at each end of the door sill and reinforced by a 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 pressed, 6.0mm thick, steel outer part and 40x113x10mm 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.
Four (4) 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 rear end frame, and each door will be capable of swinging approximately 270 degrees.

4.7.2 Each door is constructed with pressed, 3.0 mm thick, channel section steel horizontal frames for the top and bottom, 100x50x3.2mm 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.

4.7.3 Two sets of galvanized locking assemblies which is the same model with "SL-F/1" or "SJ-66M" with steel handles (two point custom sealing system) 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 four 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 an extruded triple lip type (J-C type - vertical and upper are "J", lower is "C")EPDM rubber with an increase lip at right door left top corner for better waterproof is installed to the door peripheral frames with ABS gasket retainers and fastened by stainless steel blind rivets at a pitch of 137mm. 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 five five-corrugated (die-stamped) steel panels and four corner protection plates.

4.8.1 *Roof panel*

The roof panel is constructed with 2.0m m thick die-stamped steel sheets having about 5.0m m upward smooth camber, which are welded together to form one panel 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 3.0m m 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 60x60x3.0mm thick square hollow section steel.

4.10 *Side wall*

The trapezium section side wall is constructe d with 1.6m m thick fully vertically continuous-corrugated steel panels at the interm ediate area and both ends which are butt welded together to form one panel and continuously welded to the si de rails and corner posts. All overlapped joints of inside are caulked with chloroprene sealant.

4.11 *Front structure*

Front end structure will be com posed 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 to be made of a 4.0mm thick pressed open section steel is reinforced by three internal gussets. A 200x75m m is cut out at each e nd of the bottom end rail and reinforced by a 200x75mm channel steel as a protection against handling equipment damages.

4.11.2 *Front corner post*

Each corner post is m ade of 6.0m m thick pr essed 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 top rail to be an open type of 3.0mm thick. Front header to be made of high tensile atmospheric corrosion resistant steel.

4.11.4 *Front wall*

The trapezium section front wall is constructe d 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 m ade on each locking handle retainer to cover the sealed area in accordance with TIR requirements.

4.12.2 *Lashing fittings*

Four(4) Φ 12 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 16 rings). Each lashing point is designed to provide a "1,500 kgs pull load in any direction" without any perm anent deformation of lashing ring and surrounding area.

Two (2) Φ 10 lashing rods are welded to each corner post. Each lashing rod on the corner post is designed to provide a " 1,000 kgs pull load in any direction" without any perm anent 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 dam age due to shifting cargo.

4.12.4 *Ventilator*

Each container will have four sm all plastic ventila tors of laby rinth type. Each ventilator is fixed to the upper part of each side wall by three 5.0m m dia. steel huck bolts in accordance with TIR requirements after dry ing of top coating, and caulked with sealant around the entire periphery except bottom to prevent the leakage of water.

4.12.5 If need, a locking box will be provided on the rear door according to the custom er 's requirement.

5. Surface preservation

5.1 Surface preparation

1) All steel surfaces - prior to form ing 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 approxim ately 75 m icrons thickness.
3) All fasteners such as self-tapping screws and bolts, nuts, hinges, cam keepers, 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 poly amide 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 rem ove all welding fluxes, spatters, burnt prim er coatings caused by welding heat, and other foreign materials.
   Then all blasted weldments will be coated with zinc rich epoxy primer.
2) Exterior of assembled container will be coated again 5-10 microns with zinc rich epoxy primer and again 40 microns epoxy primer prior to top coating.

5.3 Top coating

1) After dry ing of prim er, exterior of cont ainer will be coated again with high build top paint and interior will be coated again w ith poly amide cured epoxy resin based high build coating.
2) The dry film thickness of top coating will be 40 microns for the exterior and interior.

5.4 Under coating

After completion of flooring, all the understruc tures and floor will be coated with m inimum 250 microns dry film thickness bituminous coating.

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

EXT.		INT.	BASE
Zinc rich primer	20 20		20
Epoxy primer	40		
Epoxy high build coating(RAL 7035)		40	
Chlorinated rubber or Acrylic coating	40		
Bitumen		250	
Total	100 60		160

6. Marking

6.1 Arrangement

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

6.2 Materials

1) Decal : - Self-adhesive, high tensile PVC 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 underside will be caulked with sealant.

2) The owner's serial numbers and manufacturer's serial numbers will be stamped into the top plane of rear lower-left corner fitting.

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.

	Test items & loads Test	**methods**
A)	Stacking Internal load : 1.8R-T Test load: 86,400kg/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 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 : 200m m
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 : 0.4(R-T)=0.4P	Compressed air bag will be used.
H)	Wall strength (side) Test load : 0.5(R-T)=0.5P	Compressed air bag will be used on one side only.
I)	Wall strength (door) Test load : 0.4(R-T)=0.4P	Same as front wall strength test.
J)	Roof strength (weakest part) Test load : 300 kgs	Applied area will be 600x300mm longitudinal and transverse.

K)	Racking (transverse) Test load : 15,240 kgs	Hydraulic cylinder load will be applied to the header rail through top corner fittings.
L)	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.
M)	Operation of door	After completion of test, the operation of doors, locks, hinges, etc. will be checked.
N)	Dimensions and weight	After completion of test, the dimensions and weight will be checked.
O)	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

8. Guarantee

8.1 Structure

All the containers shall be guaranteed by manufacturer to be free from defects in materials, workmanship and structure for a period of one (1) year, from the date of acceptance of the container by the buyer.

8.2 Painting

8.2.1 The paint system coated on the container surface shall be guaranteed to be free from corrosion and failure for a period of three (3) years, from the date of acceptance of the container by the buyer.

8.2.2 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, excluding that resulting from impact or abrasion damage, contact with solvents or corrosive chemicals and abnormal use.

8.2.3 If the corrosion exceeds RE3 as defined above within the guarantee period, inspection of the corrosion shall be carried out by the buyer, paint manufacturer to detect the cause.
As the result of the inspection, if it is mutually agreed and accepted that the corrosion has caused for the defective paint quality and/or poor workmanship, or paint manufacturer shall correct the defect on their accounts.

8.3 Decals

Decals applied on the container shall be guaranteed for a period of seven (7) years without peeling off, tenting or colour fading.
Paint manufacture shall not be liable for any consequential damage or expenses occasioned by any defects for whatsoever reason or any loss of time due to repair or correction.