

TECHNICAL SPECIFICATION
FOR
STEEL DRY CARGO CONTAINER
40' x 8' x 9'6" ISO 1AAA TYPE
(REAR DOOR & RIGHT SIDE DOOR)

1. General

1.1 Scope

This specification will cover the design, construction, materials, testing and inspection performances of 40' x 8' x 9'6" right side & end open door type steel dry cargo 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 water-tightness.

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 830 -- Terminology in relation to freight container (Amd. 1988)
- ISO 1161 -- Series 1 freight containers - Corner fittings Specification (Amd. 1990)
- 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 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 Classification society

All the containers will be certified for design type and individually inspected by classification Society

1.4 Handling

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

- a) Lifting, full or empty, at top corner fittings vertically by means of spreaders fitted with hooks, shackles or twist-locks.
- b) Lifting, full or empty, at bottom corner fittings using slings with terminal fittings at any angles between vertical and 45 degree to the horizontal.
- c) Lifting, 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 twist-locks or equivalent at the bottom corner fittings.
- c) Rail : On flat cars or special container cars secured by twist-locks or equivalent at the bottom corner fittings.

2. Dimensions and Ratings

2.1 External Dimensions

Length	12,192	+ 0mm	40'	+0
		- 10mm		-25/64"
Width	2,438	+ 0mm	8'	+0
		- 5mm		-3/16"
Height	2,896	+ 0mm	9'6"	+0
		- 5mm		-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 : 19mm
 Front and rear diagonals : 10mm

2.2 Internal Dimensions

Length	12,032	+ 0mm	39' 5 45/64"	+0
		- 10mm		-25/64"
Width	2,288	+ 0mm	7' 6 5/64"	+0
		- 5mm		-3/16"
Height	2,453	+ 0mm	8' 0 9/16"	+0
		- 5mm		-3/16"

2.3 Rear door opening dimensions

Width	2,227	+ 0mm	7' 3 43/64"	+0
		- 5mm		-3/16"
Height	2,340	+ 0mm	7' 8 1/8"	+0
		- 5mm		-3/16"

2.4 Side door opening dimensions

Length	11,836	+ 0mm	38' 9 63/64"	+0
		- 10mm		-25/64"
Height	2,339	+ 0mm	7' 8 3/32"	+0
		- 5mm		-3/16"

2.5 Internal cubic capacity (Nominal)

67.5 cu.m 2,380 cu.ft

2.5 Gooseneck tunnel

Length	3,325.5	mm	10' 10 59/64"	
Width	1,029	+3mm	3' 4 1/2"	+1/8"
		-0mm		-0
Height	126	+0mm	4 61/64"	+0
		-3mm		-1/8"

2.6 Ratings

Max. Gross Weight (R)	24,000 kg	52,910 lbs
Tare Weight (design) (T)	5,550 kg	12,240 lbs
Max. Payload (P)	18,450 kg	40,670 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

	<u>Parts</u>	<u>Materials by JIS</u>
1)	Roof panels Door panels Side panels End panels Cross members Top side rails (wall) Door sill (rear) Bottom side rails (left) Floor center rail Rear door header Front top end rail Front bottom end rail Door horizontal frames Rear corner post	Anti-Corrosive Steel: CORTEN A, SPA-H, B480 or equivalent Y.P. : 35 kg/sq.mm T.S. : 49 kg/sq.mm
2)	Bottom side rails- "I-shaped" steel (door side)	Rolled high tensile steel SM490A or equivalent Y.P. : 33 kg/sq.mm T.S. : 50 kg/sq.mm
3)	Side door header	Structural Steel SS400 Y.P. : 25 kg/sq.mm T.S. : 41 kg/sq.mm
4)	Door locking bars	Structural steel round pipe. STK41 Y.P. : 24 kg/sq.mm T.S. : 41 kg/sq.mm
5)	Corner Fitting	Casted weldable steel. SCW480 Y.P. : 28 kg/sq.mm T.S. : 49 kg/sq.mm
6)	Locking gear cams and keepers	Forged weldable steel. S20C Y.P. : 23 kg/sq.mm T.S. : 44 kg/sq.mm
7)	Door hinge pins Door gasket retainer	Stainless steel. SUS304
8)	Door gasket	EPDM
9)	Floor board	Hardwood plywood ,min.19-ply
10)	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, a fully vertical-corrugated steel side wall, one rear door, one front end, a horizontal-corrugated steel four doors side wall, die-stamped steel roof and corner fittings.
- 4.1.2 All welds of exterior including the base frames will be continuous welding using CO₂ 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 25mm for every 200 mm. Sitich welding two-ends welding not less than 100mm long.
- 4.1.4 Gaps between adjacent components to be welded will not exceed 3 mm 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 non-welded 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 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 3mm for side structure and 4mm for front end structure.
- 4.2.4 The outside faces of the corner fittings will protrude from the side wall by nominal 7mm and from the side 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, twenty-eight (28) cross members, and a gooseneck tunnel

4.4.1 Bottom side rail

Door side bottom side rail is built of 400 x 200 x t16 x t8mm "H-shaped" steel with 8mm thick inner cover plate, another bottom side rail is built of 58x400x58x4.5mm cold-formed channel section steel that welded together and made in one piece is allowable. The floor guide rails of 3.0mm thick pressed angle section steel are provided to the bottom side rails by staggered stitch welding.

4.4.2 Cross member

The cross members are made of pressed channel section steel with a dimension of 45x122x45x4.5mm for the normal areas and 75x122x45x4.5mm for the floor butt joints, and another 45x369x45x4.0mm as side rails of forklift pockets. The cross members are placed fully to withstand floor strength and welded to each bottom side rail.

4.4.3 Gooseneck tunnel

The gooseneck tunnel consists of 4.0mm thick ten (10) cross members on the top, two (2) pressed hat section steel plate at both side, one 4.5mm thick opened section tunnel rear bolster reinforced by four gussets.

The gooseneck tunnel is designed in accordance with ISO requirements.

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 min.19-ply hardwood plywood boards are laid longitudinally on the transverse members between the 4.0mm thick flat bar steel floor centre rail and the 3.0mm thick pressed angle section steel floor guide rails stitched welded to the bottom side rails.

The floorboards are tightly secured to each transverse member by self-tapping screws, and all butt joint areas and peripheries of the floorboards are caulked with sealant.

- 1) Wood species : Apitong or Hardwood plywood
- 2) Glue : Phenol-formaldehyde resin.
- 3) Treatment :
 - a) Preservative: BASILEUM SI-84 or others.
 - b) In accordance with Australian Health Department 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 16mm dia. head x 45mm length, and fastened by four (4) screws per cross member but five (5) screws at joint areas. Screw heads are to be countersunk with about 1.5-2mm below the floor top surface.

4.6 Side door structure

The side door frame will be composed of one side door bottom side rail (door sill), two corner

posts, one side door top side rail (door header) and four corner fittings, which will be welded together to make the door-way.

4.6.1 Door sill

Please refer to 4.4.1.

4.6.2 Door corner post

Rear right corner post is constructed with pressed 6.0mm thick 'Ω' section steel outer part and two 6.0mm thick 'L' section steel inner part, welded together to form a hollow section.

Front right corner post is constructed with pressed 6.0mm thick 'Ω' section steel outer part and 6.0mm thick 'L' section and flat steel inner part, welded together to form a hollow section. 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.

Nine (9)/Five (5) sets of hinge pin lugs are welded to rear right corner post and front right corner post respectively.

4.6.3 Door header

Please refer to 4.10.

4.7 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.

4.7.1 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.

4.7.2 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 4.0mm thick pressed steel upper part, which are formed into box section by continuous welding.

4.7.3 Door corner post

Rear lift corner post of hollow section is fabricated with pressed 6.0mm thick 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.

Four (4) sets of hinge pin lugs are welded to lift rear corner post.

Rear right corner post please refer to 4.6.2.

4.8 Door

4.8.1 Each container will have double door-wings at side door frame, each door-wing will be constructed with two (2) door to be coupled by four hinges. In addition, two single-wing doors at rear end frame.

- 4.8.2 Each door is constructed with 3.0mm thick pressed channel section steel horizontal frames for the top and bottom, 100x50x3.2mm rectangular hollow section vertical frames and horizontally corrugated steel door panel, which are continuously welded within frames.
- 4.8.3 Twelve (12) sets of galvanized "SL-B " or equivalent model locking assemblies with steel handles are respectively fitted to each door 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.
- 4.8.4 The left -hand door can not be opened without opening the right hand door when the container is sealed in accordance with TIR requirements.
- 4.8.5 Each door is suspended by hinges being provided with stainless steel pins, self-lubricating brass bushings and stainless steel washers.
- 4.8.6 The door gasket to be made of an extruded triple lip J-C type EPDM rubber is installed to the door peripheral frames except bottom and the bottom used flat gasket, which with steel gasket retainers must be caulked with butyl sealant before installation of gasket, and fastened by stainless steel rivets at a pitch of 150mm.

4.9 Roof structure

The roof will be constructed with five five-corrugated (die-stamped) steel panels and four corner protection plates.

4.9.1 Roof panel

The roof panel is constructed with 2.0mm thick die-stamped steel sheets having about 6.0mm 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 non-welded seams are caulked with chloroprene sealant.

4.9.2 Protection plate

Each corner of the roof in the vicinity of top corner fittings is reinforced by 3.0mm thick rectangular steel plate to prevent the damage caused by mishandling of lifting equipment.

4.10 Top side rail

Right side top side rail (door header) is made of a 6.0mm thick pressed "L" section steel upper part and 150x100x4.0mm rectangular hollow section steel lower part, which are formed into box section by continuous welding.

Left top side rail is made of a 60x60x3.0mm thick square hollow section steel.

4.11 Side wall

The trapezium section side wall is constructed with 2.0mm thick fully vertically continuous-corrugated steel outer panels near the each post and intermediate inner panels, which are butt welded together to form one panel and continuously welded to the side rails and corner posts. All overlapped joints of inside are caulked with chloroprene sealant.

4.12 Front end structure

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

4.12.1 Bottom end rail

The bottom end rail to be made of 4.0mm thick pressed open section steel is reinforced by three internal gussets. Reinforcement plates made of 4.0mm thick are welded to bottom corner fittings.

4.12.2 Front end corner post

Corner posts for one side are made of 6.0mm thick pressed open section steel in a single piece, and for the other side, the corner posts (door corner posts) please refer to 4.6.2 and designed to give a sufficient strength against stacking and racking forces.

4.12.3 Top end rail

The top end rail is constructed with 4.0mm thick pressed steel.

4.12.4 Front end wall

The trapezium section end wall is constructed with 2.0mm thick vertically corrugated steel panels, butt welded together to form one panel, and continuously welded to end rails and corner posts. All overlapped joints of inside are caulked with chloroprene sealant.

4.13 Special feature

4.13.1 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.

4.13.2 Ventilator

Each container will have two small plastic ventilators of labyrinth type. The ventilator is fixed to the upper part of side wall by aluminium huck bolts in accordance with TIR requirements after drying of top coating, and caulked with sealant around the entire periphery except bottom to prevent the leakage of water.

4.13.3 Lashing fittings

Ten (10) Φ 12 lashing hoop rings are welded to top and bottom left side rail at recessed corrugations of side panels but not extruded any cargo space (total 20 rings). Each lashing point is designed to provide a "1,500 kgs pull load in any direction" without any permanent deformation of lashing ring and surrounding area.

Ten (10) lashing hoop rings in floor near right side door sill, but not extruded any cargo space (total 10 rings). Each lashing point is designed to provide a "1,500 kgs pull load in any direction" without any permanent deformation of lashing ring and surrounding area.

Three (3) lashing rods are welded to each left corner post. Each lashing point is designed to provide a "1,000 kgs pull load in any direction" without any permanent deformation of lashing ring and surrounding area.

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 with near white metal surface, and anchor profiles of 25 to 35 microns 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.
- 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 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) All surfaces of the assembled container will have coating system as following:

Exterior:

Zinc rich primer	10 microns (before ass'y)
Zinc rich primer	20 microns (after ass'y)
Polymide epoxy	40 microns
Acrylic coating	40 microns
Total D.F.T.	min. 110 microns

Interior:

Zinc rich primer	10 microns (before ass'y)
Zinc rich primer	20 microns (after ass'y)
Polymide epoxy	40 microns
Total D.F.T.	min. 70 microns

Base:

Zinc rich primer	10 microns (before ass'y)
Zinc rich primer	30 microns (after ass'y)
Bituminous	200 microns
Total D.F.T.	240 microns (including all the base steel structure)

Under the wooden floor : Approx. 200 microns Bituminous coating.

6. Marking

6.1 Arrangement

The container will be marked in accordance with ISO, TCT, TIR and CSC 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 thickness 0.8mm 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 bottom will be caulked with sealant.
- 2) The owner'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.

	<u>Test items & loads</u>	<u>Test methods</u>
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 Time duration : 5 minutes
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
C1)	Lifting (for forklift pockets) Internal load : 1.6R-T	Lifting by horizontal bars. Bar length : 1,828mm Bar width : 200mm Time duration : 5 minutes
D)	Restraint (longitudinal) Internal load : R-T Test load : 2R	Hydraulic cylinder load will be applied to the bottom side rails. Time duration : 5 minutes
E)	Wall strength (end) Test load : $0.4(R-T)=0.4P$	Compressed air bag will be used. Time duration : 5 minutes
F)	Wall strength (side) Test load : $0.5(R-T)=0.5P$	Compressed air bag will be used on one side only. Time duration : 5 minutes
G)	Roof strength (weakest part) Test load : 300 kg	Applied area will be 600x300mm longitudinal and transverse.
H)	Floor strength Test load : 5,460 kg (12,040 lb)	Use of a special truck. Total contact area: 284 sq.cm Wheel width : 180 mm Wheel centre : 760 mm
I)	Racking (transverse) Test load : 15,240 kg	Hydraulic cylinder load will be applied to the header rail through top corner fittings. Time duration : 5 minutes

40'X8'X9'6"

J)	Racking (longitudinal) Test load : 7,620 kg	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. Time duration : 5 minutes
K)	Operation of door	After completion of test, the operation of doors, locks, hinges, etc. will be checked.
L)	Dimensions and weight	After completion of test, the dimensions and weight will be checked.
M)	Weather-tightness	Inside diameter 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

