

**TECHNICAL SPECIFICATION
FOR
STEEL DRY CARGO CONTAINER
40'x8'x8'6" ISO 1AA TYPE**

***- OPEN AT BOTH END -
- WITHOUT FORKLIFT POCKETS -***



1.1 Scope

This specification will cover the design, construction, materials, testing and inspection performances of 40'x8'x8'6" ISO. 1AA type steel dry cargo containers.

These containers specified herein will be manufactured at _____ under strict quality control by RYC 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 -40°C (-40°F) to +70°C (+158°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 (1AA type)

ISO 668 - Series 1 freight containers - Classification external dimensions and ratings (4th edition - 1988) (except internal length)

ISO 830 - Terminology in relation to freight container (1st edition - 1981)

ISO 1161 - Series 1 freight containers - Corner fittings Specification (4th edition - 1984)

ISO 1496-1 - Series 1 freight containers - Specification and testing.
Part 1: General cargo containers for general purposes (5th edition - 1990)

ISO 6346 - Freight containers - coding, identification and marking (3rd edition - 1995)

1.3.2 T.I.R. Certification

All the containers will be certified and complied with "The Customs Convention on the International Transport of Goods under the cover of T.I.R. Carnets." or "The Customs Convention on Containers."

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1.3.3 C.S.C. Certification

All the containers will be certified and complied 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 complied 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, BV, ABS, LR or CCS.

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

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 twistlocks.
- b) Lifting, full or empty, at bottom corner fittings using slings with terminal fittings at any angles between vertical and 30 degrees to the horizontal.

1.5 Transportation

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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	12,192 + 0mm	40'	+0
	-10mm		-25/64"
Width	2,438 + 0mm	8'	+0
	- 5mm		-3/16"
Height	2,591 + 0mm	8'6"	+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	3/4"
Front and rear diagonals	:	10mm	3/8"

2.2 Internal Dimensions (nominal)

Length	11,978 mm
Width	2,352 mm
Height	2,393 mm

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2.3 Door opening dimensions (nominal)

Width	2,343 mm
Height	2,280 mm

2.4 Internal cubic capacity (Nominal)

67.4 cu.m	2,381 cu.ft
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2.5 Gooseneck tunnel

Length	3,266 mm		
Width	1,029 +3mm	3' 4 1/2"	+1/8"
	-0mm		-0
Height	120 +0mm	4 23/32"	+0
	-3mm		-1/8"

2.6 Ratings

Max. Gross Weight (R)	30,480 kgs	67,200 lbs
Tare Weight (design) (T)	3,800 kgs	8,380 lbs
Max. Payload (P)	26,680 kgs	58,820 lbs

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) All steel except screws, rivets, bolts/nuts, door hardwares and other shown on drawings and specification	Anti-corrosive steel. SPA-H or equivalent Y.P. : 35 kg/mm ² T.S. : 49 kg/mm ²
2) Rear corner posts (inner)	Rolled high tensile steel. SM50A Y.P. : 33 kg/mm ²

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	T.S. : 50 kg/mm ²
3) Door hinges	S25C Y.P. : 27 kg/mm ² T.S. : 45 kg/mm ²
4) Door locking bars	Structural steel round pipe. STK41 Y.P. : 24 kg/mm ² T.S. : 41 kg/mm ²
5) Corner fittings	Casted weldable steel. SCW49 Y.P. : 28 kg/mm ² T.S. : 49 kg/mm ²
6) Locking gear cams and keepers	S20C Y.P. : 25 kg/mm ² T.S. : 41 kg/mm ²
7) Door hinge pins Gasket retainers	Stainless steel.
8) Door gasket	EPDM
9) Floor board	Hardwood plywood.
10) Ventilator	ABS resin labyrinth type

* Note: Y.P. - Yielding Point
T.S. - Tensile Strength

4. Construction

4.1 General

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4.1.1 The container will be constructed with steel frames, fully vertical-corrugated steel sides, horizontal-corrugated steel double doors at both end, 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.

4.1.3 Interior welds - when needed - will be stitched with a minimum length of 15 mm.

4.1.4 Gaps between adjacent components to be welded will not exceed 3 mm or the 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 internal bend radii of pressed sections of steel will be not less than 1.5 time the thickness of the materials being pressed.

4.1.7 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 all transverse members shall be positioned by 12.5 mm +5/-1.5 mm 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 6 mm 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 nominal 3 - 4 mm.

4.2.4 The outside faces of the corner fittings will protrude from the outside faces of the sides by nominal 7 - 8 mm.

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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 6.0 mm 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 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 set of forklift pockets and a set of gooseneck tunnel.

4.4.1 Bottom side rail

Each bottom side rail is built of a 50x158x30x4.5mm thick cold formed channel section steel made in one piece.

The floor guide rails of 2.3mm thick pressed angle section steel are provided to the bottom side rails by staggered stitch welding.

The lower flange of the bottom side rail is outward so as to facilitate easy removal of the cross members during repair and of less susceptible corrosion.

Reinforcement plates to be made of 4.0mm thick flat steel is welded to bottom corner fitting.

4.4.2 Cross member

The cross members are made of pressed channel section steel with a dimension of 45x122x45x4.0mm for the normal areas and 75x122x45x4.0mm for the floor butt joints. The large one is reinforced by three 4.0 mm thick gussets. 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 4.0 mm thick one piece pressed hat section tunnel plate, twelve 4.5 mm thick pressed channel section bows, one 4.0 mm thick enclosure

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section tunnel rear bolster which is made of two pressed "C" section, and sixteen 4.0 mm thick tunnel outriggers.

The gooseneck tunnel is designed in accordance with ISO requirements.

4.5 Flooring

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

4.5.1 Floor

The wooden floor to be constructed with 28 mm thick hardwood plywood boards are laid longitudinally on the transverse members between the 50x4.0 mm thick flat section steel floor centre rail and the 2.3 mm thick pressed angle section steel floor guide rails stitched welded to the bottom side rails.

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

1) Wood species: Apitong / Hardwood.

2) Glue: Phenol-formaldehyde resin.

3) Treatment:

a) Preservative: Meganium or equivalent.

In accordance with Australian Health Department Regulations.

b) Average moisture content will be 14% 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 screws per cross member but five screws at joint areas. Screw heads are to be countersunk with about 2mm below the floor top surface.

4.6 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.

4.6.1 Door sill

The door sill to be made of a 4.5 mm thick pressed open section steel is reinforced by four internal gussets at the back of each locking cam keeper location.

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The upper face of the door sill has a 10 mm slope for better drainage. There is cut out at each end of the door sill and reinforced by a 200x75x9.0 mm 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 4.5 mm thick pressed steel outer part and 40x113x12 mm thick 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 4.0 mm thick pressed "U" section steel lower part having four internal gussets at the back of each locking cam keeper location and a 3.0 mm 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 front end frame, and each door will be capable of swinging approximately 270 degrees.

4.7.2 Each door is constructed with two 3.0 mm thick pressed channel section steel horizontal frames for the top and bottom, two 100x50x3.2 mm thick rectangular hollow section vertical frames for the post side and center of door, 2.0 mm thick horizontally corrugated steel door panel, which are continuously welded within frames.

4.7.3 Two sets of galvanized "BE2566 MN" bolt on model locking assemblies with forged steel handles and two points sealing system are fitted to each door using 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 of container.

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.

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4.7.5 The door hold-back of nylon rope is provided to the center 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 the stainless steel washers, which are placed at the hinge lugs of the rear corner posts.

4.7.7 The door gasket to be made of an extruded J&C-type EPDM rubber is installed to the door peripheral frames with stainless steel gasket retainers which must be caulked with butyl sealant before installation of gasket, and fastened by stainless steel rivets at a pitch of 150 mm.

4.8 Roof structure

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

4.8.1 Roof panel

The roof panel is constructed with 2.0 mm thick die-stamped steel sheets having about 5.0 mm 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 3.0mm 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 constructed with 2.0 mm thick fully vertically continuous-corrugated steel outer panels near the each post and 1.6 mm thick intermediate inner panels, which are butt welded together to form one panel and continuously welded to the side rails and corner posts.

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4.11 Front structure

The front end structure will be composed of the same as rear frame and door except following contents:

a) Front door sill

The upper part of the front door sill to be made of a 30x113x12 mm thick hot rolled channel section steel with 4.5 mm thick cover steel plate, the lower parts are made of two 4.0 mm thick "U" section steel rails which separated into "L" and flat section, and two 4.0 mm thick floor board supports, which are welded together.

There is cut out at each end of the door sill and reinforced by a 200x75x9.0 mm channel steel as a protection against handling equipment damage.

b) Locking gears

The lower part of locking gear at the front door sill above gooseneck tunnel will be special lock cam and lock cam keeper (smaller).

4.12 Special feature

4.12.1 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.

4.11.2 Lashing fittings

Ten (10) dia. 12mm 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 40 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) dia. 12mm lashing rods are welded to each corner post at the position of 150 mm higher from the floor and 200 mm lower from the bottom surface of top corner fittings and middle of the corner post.. Each lashing rod on the corner post is designed to provide a "1,000 kgs pull load in any direction" without any permanent deformation.

4.11.3 Shoring slot

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A shoring slot, having a size of 61.5mm width x 40mm 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 damage due to shifting cargo.

4.11.4 Ventilator

Each container will have two labyrinth type small plastic ventilators.

Each ventilator is fixed to the right hand upper part of each side wall by three 5.0 mm dia. steel Huck bolts in accordance with TIR requirements after drying of top coating, and caulked with sealant around the entire periphery except underside to prevent the leakage of water.

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 SA 2 1/2 to remove all rust, dirt, mill scale and all other foreign materials.

The shot blasted surface profile shall be have a maximum peak to valley height not exceeding 50 microns and average peak to valley height of about 25 microns.

2) All door hardwires 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 and lashing fittings will be electro-galvanized with approximately 13 microns thickness.

5.2 Coating

5.2.1 Prior to assembly

All steel surfaces will be coated with 10 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

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All weldments will be shot blasted to remove all welding fluxes, splatters, burnt primer coatings caused by welding heat, and other foreign materials.

Then all blasted weldments will be coated with zinc rich epoxy primer.

5.2.3 The total dry film will be (microns):

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

<i>Where</i>	<i>Paint name</i>	<i>DFT (u)</i>
Exterior surface	zinc rich primer	30
	Epoxy primer	40
	Acrylic top coating(RAL 5010)	50
		Total: 120
Interior surface	zinc rich primer	25
	Epoxy high build coating	50
		Total: 75
Under structure	zinc rich primer	25
	Bitumen	200
		Total: 225

6. Marking

6.1 Arrangements

The containers will be marked in accordance with ISO, TCT, UIC, 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 color fading.

2) Certification plate: Stainless steel plates to be chemically etched by acid.

6.3 Specifications

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1) Identification plates such as consolidated data plate consisting of CSC, TIR and TCT will be riveted on the door permanently by stainless steel 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 on top face of the bottom rear corner fitting.

7. Testing

7.1 Prototype testing

The prototype container 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 : 86,400 kg/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 30 deg. to the horizontal. 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.
E)	Floor strength Test load : 7,260 kgs (16,000 lbs)	Use of a special truck. Total contact area: 284 sq.cm Wheel width : 180 mm

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		Wheel centre : 760 mm
F)	Wall strength (side) Test load : $0.6(R-T)=0.6P$	Compressed air bag will be used on one side only.
G)	Wall strength (door) Test load : $0.4(R-T)=0.4P$	Compressed air bag will be used.
H)	Roof strength (weakest part) Test load : 300 kgs	Applied area will be 600x300mm longitudinal and transverse.
I)	Racking (transverse) Test load : 15,240 kgs	Hydraulic cylinder load will be applied to the header rail through top corner fittings.
J)	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.
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)	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

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