



TECHNICAL SPECIFICATION

FOR

STEEL OPEN HARD TOPCONTAINER

20' x 8' x 8'6" TYPE (Steel Floor)

MODEL NO

: CX13-20KDX01

SPEC. NO

: CX13-20KDX01-S

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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 type steel dry cargo containers.

These containers specified herein will be manufactured at (hereinafter referred to 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° Cto $+65^{\circ}$ C 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

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 1894	General purpose series 1 freight containers - Minimum internal dimensions
	(2nd edition - 1979)
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 <u>U.I.C. Registration</u>

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

1.3.5 Classification society

All the containers will be certified for design type and individually inspected by classification society, BV, ABS

Note:

BV Bureau Veritas (France)

ABS American Bureau of Shipping (USA)

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 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 based on 24,000kg M.G.W.

On the deck of vessels, four (4) high stacked based on 24,000kg M.G.W.

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.

On flat cars or special container cars secured by twistlocks or equivalent at c) Rail

the bottom corner fittings.

2. <u>Dimensions and Ratings</u>

2.1 External Dimensions

Length	6,058 + 0mm	19'10 1/2"	+0
	- 6mm		-1/4"
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: 13mm 1/2"
Front and rear diagonals: 10mm 3/8"

2.2 <u>Internal Dimensions</u>

Length	5,898	+ 0mm	19' 4	13/64"	+0
Width	2,332	- 6mm + 0mm	7' 7	52/64"	-1/4" +0
	•	- 5mm			-3/16"
Height	2,349.5	5 + 0mm - 5mm	7' 8	1/2"	+0 -3/16"

2.3 <u>Door opening dimensions</u>

Width	2,340	+ 0mm	7' 8	1/8"	+0
Height	2,224	- 5mm + 0mm	7' 3	9/16"	-3/16" +0
		- 5mm			-3/16"

2.4 Roof opening dimensions

Length	5,560 + 0mm	18' 2 29/32"	+0
	- 5mm		-3/16"
Width	2,230 + 0mm	7' 3 51/64"	+0
	- 5mm		-3/16

2.4 <u>Internal cubic capacity (Nominal)</u>

32.3 cu.m 1,140 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 +/- 50 mm	6' 9 7/8" +/-2"

2.6 Ratings

Max. Gross Weight (R)	30,480 kgs	67,200 lbs
Tare Weight (design) (T)	2,890 kgs	6,370 lbs
Max. Payload (P)	27,590 kgs	60,830 lbs

Tare Weight Tolerance 2%

3. <u>Materials</u>

3.1 General

The following materials will be used in the construction of containers.

3.2 Part specification

	<u>Parts</u>	Materials by JIS
1)	All steel except screws, rivets, bolts/nuts, door hardwares and other shown on	equivalent
Per de la constitución de la con	drawings andspecification	Y.P. : 35 kg/sq. mm T.S. : 49 kg/sq. mm
2)	Rear corner posts (inner)	Rolled high tensile steel. SM50A
Ĭ	Roof rail	Y.P. : 37 kg/sq. mm
		T.S. : 50 kg/sq. mm
3)	Door hinges	S25C
		Y.P. : 25 kg/sq.mm
		T.S. : 45 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	Stainless steel: SUS304
Box	Door gasket retainer	
8)	Door gasket	EPDM
	Roof gasket	
9)	Floor board	4.5mm thick checkered steel plates

* 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, removable steel cover 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, butyl sealant is used to caulk at 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.

4.2 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 outside faces of the corner fittings will protrude from the outside faces of the corner posts by nominal 3-4 mm.
- 4.2.3 The outside faces of the corner fittings will protrude from the outside faces of the sides and front wall by nominal 7-8 mm.
- 4.2.4 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.
- 4.2.5 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.

4.2.6 Corner fittings

The corner fittings will be designed in accordance with ISO 1161 (1984 edition) and manufactured at the works approved by classification society.

4.3 Base frame

Base frame will be composed of two bottom side rails, 19 ranks cross members and one sets of fork pockets, which are welded together as a sub-assembly.

4.3.1 Bottom side rail

Gauge: 4.5mm

Geometry:

160x60x30mm cold rolled channel section.

Features: Reinforcement plates to be made of 4.0mm thick flat steel plates. The plates are welded to bottom corner fitting.

4.3.2 Cross member

Gauge: 45×150×45×4.0mm

Assembly: Continuous weld to bottom side rails.

4.3.3 Fork pocket

Gauge:Top plate: 3.0mm
Bottom end plate: 6.0mm

Geometry: Every pocket is constructed with both adjacent cross members, a top plate and

two bottom end plates of 200mm deep.

4.3.4 Floor

The floor will be constructed with 4.5mm thick checkered steel plates which will be butt welded and continuously welded to end sill and bottom side rails , and stitch welded to crossmembers.

4.4 Front frame

Front frame will be composed of one front bottom rail, two corner posts, one front header four corner fittings and a front wall, which are welded together as a sub-assembly.

4.4.1 Front top rail

The front header is constructed with 100x251x4.0mm channel section and t4.0 mm thick steel plate upper part. One 30x30xt3.0 mm thick square hollow section steel continuous welded to upper face of front top rail.

4.4.2 Front corner post

Each corner post is made of 6.0 mm thick pressed open section steel in a single piece, and designed to give a sufficient strength against stacking and racking forces.

4.4.3 Front bottom rail

The bottom end rail to be made of a 4.0mm thick pressed open section steel is reinforced by three internal gussets. A 200x75mm is cut out at each end of the bottom end rail and reinforced by a 200x75mm channel steel as a protection against handling equipment damages.

4.4.4 Front panel

The trapezium section front wall is constructed with 2.0 mm thick vertically corrugated steel panels, but welded together to form one panel, and continuously welded to front end rails and corner posts.

4.5 Rear frame

Rear frame will be composed of two corner posts, one door sill, one door header and four corner fittings, which are welded together as a sub-assembly.

4.5.1 Rear corner post

Each rear corner post of hollow section is fabricated with 6.0 mm thick pressed steel outer part and 40x113x10 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.

4.5.2 Door header

The door header is constructed with a 4.0 mm thick pressed section steel lower part having four

internal gussets at the back of each locking cam keeper location and a 4.0 mm thick pressed steel upper part, which are formed into box section by continuous welding.

4.5.3 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 Door

- 4.6.1 Each container will have double wing doors at rear end frame, and each door will be capable of swinging approximately 270 degrees.
- 4.6.2 Each door is constructed with two 3.0 mm thick pressed channel section steel horizontal frames for the top and bottom, 100x50x3.2 mm thick rectangular hollow section vertical frames for the post side and center side of door respectively, 2.0 mm thick horizontally corrugated steel door panel, which are continuously welded within frames.
- 4.6.3 Two sets of galvanized "BE-2566MN" locking assemblies with forged steel handles are fitted to each door using high tensile zinc plated steel bolts and Huck 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 the container.
- 4.6.4 The left hand door can not be opened without opening the right hand door when the container is sealed in accordance with TIR requirements.
- 4.6.5 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.
- 4.6.6 Each door is suspended by four hinges being provided with stainless steel pins, self-lubricating brass bushings and stainless steel washers, which are placed at the hinge lugs of the rear corner posts.
- 4.6.7 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 rivets at a pitch of 150 mm.

4.7 <u>Side</u>

4.7.1 Top side rail

Each top side rail is made of a 100x100x5.0 mm rectangular tube

4.7.2 Side panel

The trapezium section side wall is constructed with 2.0 mm thick fully vertically continuous-corrugated steel o panels, which are butt welded together to form one panel and continuously welded to the side rails and corner posts.

4.8 Roof frame

Roof frame will be composed of two longitudinal rails, two transverse rails and one roof which are welded together as a sub-assembly.

4.8.1 The roof panel is constructed with 2.0 mm thick die-stamped steel sheets having about 6.0 mm upward smooth camber, which are welded together to form one panel and continuously welded to the roof frame rail. All overlapped joints of inside unwelded seams are caulked with chloroprene sealant.

4.8.2 Roof frame rail

The roof frame rail is constructed with $80 \times 43 \times t5$. 0 channel beams, which are welded together to form one frame.

4.8.3 Lift ring

Gauge: \$\phi\$ 16mm galvanized round iron.

Assembly: Each longitudinal rails be welded to two lift rings.

- 4.8.4 Six sets of galvanized roof locking assemblies with pressed steel handles are fitted to side using Huck bolts according to TIR requirements. The dia. of locking rod will be φ 25mm, Locking gears should be assembled after painting of the container.
- 4.8.5 The roof gasket to be made of an extruded EPDM rubber is installed to the roof peripheral frames with stainless steel gasket retainers which must be caulked with butyl sealant before installation of gasket, and fastened by stainless rivets at a pitch of 150 mm.

4.9 Special feature

4.9.1 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.

4.9.2 Lashing fittings

Five (5) 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 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.

Three (3) lashing rods are welded to each corner post at the position of 500 mm from the bottom surface of top corner fitting and 418 mm from the top surface of bottom corner fitting.

Each lashing rod on the corner post is designed to provide a "1,000 kgs pull load in any direction" without any permanent deformation.

4.9.3 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 damage due to shifting cargo.

5. Surface preservation

5.1 Surface preparation

- 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 and roof locking assemblies 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 The total dry film will be (microns):

	EXT.& INT.	BASE
1st shop primer	10	10
Waterborne Epoxy zinc primer	20	20
Waterborne Epoxy middle coat	40	
Waterborne Epoxy top coat		
Waterborne Acrylic top coat	40	
Waterborne undercoating		200
Total	110	230

Note: The equivalent effect waterborne paint and waterborne undercoating will be applied. The paint system and supplier (inclusive of undercoating) will be submitted to customer's approval in advance before production.

6. Marking

6.1 Arrangement

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

6.2 Materials

1) Decal: - Self-adhesive, high tensile PVC film

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 and TIR 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 into the top plane of rear lower corner fitting.

7. <u>Testing and Inspections</u>

7.1 <u>Testing</u>

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 : 200mm
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: 0.6(R-T)=0.6P	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)	Racking (transverse) Test load: 15,240 kgs	Hydraulic cylinder load will be applied to the header rail through top corner fittings.
()	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.

		20 120 120 0
L)	Operation of door	After completion of test, the operation of doors,
	Operation of door	locks, hinges, etc. will be checked.
M)	Dimensions and weight	After completion of test, the dimensions and weight will be checked.
N)	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. <u>Guarantee</u>

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 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 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, and 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, and/or paint manufacturer shall correct the defect on their accounts.

8.3 <u>Decals</u>

Decals applied on the container shall be guaranteed for a period of years without peeling off, tenting or colour fading if decals are supplied by

















