Technical Specification

For

53'x 8'6 3/8"x 9'6-1/2"

Steel Domestic Container

(YRC)

Specification No. : AD53-067SS

Drawing No. : AD53-067G

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Scope

This specification covers design, construction, materials, testing, inspection and prototype container. The container is built by Guangdong Xinhui CIMC Special Transportation Equipment Co., Ltd. (XCSE).

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1. General

1.1 Operational Environment

The container will be designed and constructed for the domestic transportation of general cargo on road and rail, and will be demountable from railway cars and highway chassis, and will be interchangeable between the rail and highway modes of transport.

All materials used in the construction will be able to withstand extreme temperature ranging from -40°C(-40°F) to 70°C(158°F) without effect on container's strength and watertightness.

1.2 Standards and Regulation

The containers shall be built in accordance with the latest editions of AAR M-930-14.

1.3 Handling

The 40' position top handling fittings to be wide top apertures at 2448mm (96-3/8") centers for top lifting and stacking. The 40' position lower handling fitting to be low profile with apertures at 2261mm (89") and 2448mm (96-3/8") centers. The container will be constructed to be capable of being handled without any permanent deformation which will render it unsuitable for use or any other abnormality during the following conditions:

- 1) Lifting, full or empty, at 40' position top corner fittings vertically by means of spreaders fitted with hooks, shackles or twistlocks.
- 2) Lifting, full or empty, at the lifting pads using a straddle type forklift.

1.4 Transportation

The container shall be provided for securement at the lower fitting locations to industry standard roadway chassis, flatbeds, COFC railcars, TOFC railcars, and double-stack railcars equipped with deck-mounted, low-profile, AAR-approved twist lock or pin locks. Handling fittings shall be capable of utilizing manual, semiautomatic, and fully automatic interbox connectors when stacked in double-stack railcars as well as low-profile-type (3.375-in. maximum height cone) COFC pedestal and twist-lock devices.



2. Dimension and ratings

2.1 External Dimensions

Length	16,154	(+0,-10) mm	53' - 0"	(+ 0", -3/8")
Width	2,600	(+0,-5) mm	8' - 6 3/8"	(+ 0", -3/16")
Height	2,908	(+0,-5) mm	9' – 6 1/2"	(+ 0", -3/16")

No part of the container will project beyond the external dimensions mentioned above.

Maximum allowable differences between two diagonals on any one of the following surfaces are as follows:

Roof, bottom and side diagonals	19 mm	3/4"
Front and rear diagonals	10 mm	3/8"

2.2 Internal Dimensions (nominal)

Length	16,006mm	52' - 6 3/16"
Width (Between panels)	2,526mm	8' - 3 7/16"
Height	2,781mm	109 1/2"

2.3 <u>Door opening dimensions (nominal)</u>

Width	2,489 mm	8' - 2 "
Height	2,781 mm	109 1/2"

2.4 Gooseneck channel (nominal)

Length	 3251 mm	128"
Width	 1,029 mm	40 1/2"
Height	 79 mm	3 1/8"

2.5 Internal capacity (nominal)

	112.4 cu.m.	3,970 cu.f
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2.6 Ratings

Max. gross weight	30,480 kg	67,200 lbs
Max. payload	25,480 kg	56,180 lbs
Tare weight (Tolerance +2%)	5,000 kg	11,020 lbs



3. Construction

3.1. General

3.1.1. Base

"I" beam crossmember, Exposed type gooseneck tunnel, Laminated oak wood floor.

3.1.2. Door

Corrugated door with "J-C" type door seal.

3.1.3. Roof

Corrugated steel roof panel.

3.1.4. Side

Corrugated steel side wall.

3.2. Base frame

3.2.1. Bottom side rail (main)

Material : JIS SPA-H

Geometry: 305mm high double "Z" shaped section.

Gauge: 4.0mm

Features : Stiffeners are to be welded at each end of the bottom side rail.

3.2.2. Bottom side rail (end)

Material : Extra high strength steel (700Mpa)

Geometry: 305mm high double "Z" shaped section.

Gauge : 3.0mm

Features : Stiffeners are to be welded at each end of the bottom side rail.

3.2.3. Crossmembers

Material : Extra high strength steel (700Mpa) – "I" beam Bottom flange

Extra high strength steel (550Mpa)- Hat section

JIS SPA-H – "I" beam Top flange and Web

Geometry: Welded "I" beam for main and hat section for rear end.

Gauge: Main - 57mm high with 60mm top flange and 50mm bottom

flange with 3.0mm thick web and 4.0mm thick flange.

Rear end – 4.0mm thick hat section pressing.

Location : As per drawing.

Assembly : Fully welded to bottom side rail.



3.2.4. Gooseneck tunnel

Material : Extra high strength steel (700Mpa)

Geometry: Exposed type to be constructed from 4.0mm side rails and

6.0mm top plate.

Assembly : Continuous welding.

3.2.5. Tunnel bolster

Material: JIS SPA-H - upper, SM490A - lower

Geometry: Box shaped hollow member constructed from 6.0mm upper

pressed and 8.0mm lower plate.

Assembly : Continuous welding.

3.2.6. Tunnel outrigger

Material: Extra high strength steel (700Mpa) – "I" beam Bottom flange

JIS SPA-H - "I" beam Top flange and Web

Geometry: Welded "I" beam.

Gauge: 54mm high with 60mm top flange and 50mm bottom flange with

3.0mm thick web and 4.0mm thick flange.

Location : As per drawing.

Assembly : Fully welded to bottom side rail.

3.2.7. Lifting Pad

Material : JIS SPA-H

Geometry : Pressed channel section.

Gauge : 4.0mm

Location : Per A.A.R. regulation.

3.3. Front frame

3.3.1. Corner post

Material : JIS SPA-H

Geometry: "L" shaped single open pressing

Gauge: 3.0 mm

Features : Bottom aperture hole to be provided into corner post to a 89"

center distance for both chassis twist lock and slide pin

securement.



3.3.2. Top rail

Material : JIS SPA-H

Geometry: Rectangle tube lower and plate upper.

Gauge: Upper - 3.2mm, Lower - 100x50x3.0mm rectangle tube

Assembly : Upper is fully welded to lower at exterior and stitch welded

and sealed at the interior.

3.3.3. Bottom rail

Material: JIS SPA-H - Bottom rail, floor support angle & gusset.

JIS SS400 -Triangular corner gusset.

Geometry : Square tube bottom rail with floor support angle, gooseneck

gusset and corner gusset.

Gauge : Bottom rail - 100x50x3.0mm rectangle tube

Floor support angle - 4.0mm

Corner gusset – 8.0mm

Assembly : Floor support angle to be welded at the bottom rail.

Triangular corner gusset fully welded on both sides to bottom

rail and corner post.

3.3.4. End panel

Material : JIS SPA-H

Geometry: Trapezium section horizontally corrugated with 45.6mm depth

Gauge : 2.0 mm

Assembly: Panels are butt welded together and fully welded to front rails

and corner posts. Stitch welded and sealed internally to front

top & bottom rail and sealed to interior of the corner post. One manifest receptacle to be installed at front panel.

3.4. Rear frame

3.4.1. Corner post

Material : JIS SPA-H

Geometry: Rectangular box section composed of outer and inner.

Gauge : Outer – 4.5 mm thick pressing.

Inner – 3.2 mm thick pressed channel section.

Assembly : Continuous welding.

Features: Three (3) 13 mm diameter lashing bars, per post welded to

the rear corner post.



3.4.2. Door header

Material : JIS SPA-H

Geometry: Rectangular box section consisting of upper and "U" shaped

pressing lower.

Gauge: Upper - 3.2mm, Lower - 4.5mm, Reinforcement - 4.0mm

Assembly : Continuous welding.

Features : Four (4) gussets of 4.0mm steel are welded behind the cam

keeper.

3.4.3. Door sill

Material : Extra high strength steel (700Mpa) - Upper & lower

JIS SPA-H - Gussets

Geometry: Rectangular box section fabricated from upper pressing and

lower plate.

Gauge: 6.0 mm

Features : Four gussets of 4.0mm thick steel are welded behind the cam

keepers.

3.4.4. Door frame reinforcement

Material : JIS SS400 Geometry : "L" shape

Features: Two reinforcements are welded to the top corner, connected

to the rear corner post and door header / sill.

3.5. Intermediate frame

3.5.1. Intermediate corner post

Material : Extra high strength steel (700Mpa)

Geometry: Box section composed of outer pressing and inner plate.

Gauge: Outer - 4.0 mm, Inner – 4.0 mm.

Assembly : Continuous welding.

3.5.2. Intermediate top rail

Material: JIS SPA-H – Upper & reinforcement

Extra high strength steel (700Mpa) –Lower

Geometry: Integral section fabricated from upper and lower with

reinforcement at each top corner.

Gauge: Upper – 3.2mm, Lower – 4.0mm, Reinforcement - 3.2mm

Assembly: Continuous welding.



3.5.3. Intermediate bottom rail

Material: Extra high strength steel (700Mpa) - Upper & lower

JIS SPA-H - Reinforcement

Geometry: Closed box section with lower and upper with reinforcement

at each corner.

Gauge: 4.0 mm – upper and reinforcement, 4.5 mm – lower.

Features : Internal doubler plates applied to lower face adjacent to lower

corner fittings.

Assembly : Continuous welding.

3.6. <u>Side</u>

3.6.1. Top side rail

Material : JIS SPA-H
Geometry : Square tube.
Size : 60x60x2.3mm

3.6.2. Panel

Material: Weather resistant Extra high strength steel & JIS SPA-H Geometry: 30 mm depth trapezium section corrugated and 213 pitch.

Gauge: Front end: 1.5mm; Rear end: 1.5mm;

40' Position (outer): 1.5mm; 40' Position (inner): 1.2mm.

Assembly: Panels are butt welded together and fully welded to exterior of

container frame, stitch welded and sealed to interior of corner

posts, sealed to interior of top side rail.

3.6.3. Ventilator

Material : Plastic (ABS)

Geometry: Small labyrinth type. (8 pcs/box)

Assembly: Fastened by 5.0mm diameter huck bolt.

Features : To be sealed with sealant around the perimeter of ventilator

except bottom line.

3.6.4. Ancra-Track

Material : 6351 T6 Aluminum Ancra part # : 50419-11-91.00

Assembly : Ancra tracks are fastened to the side panel by rivets.



3.7. Roof

3.7.1. Panel

Material : Weather resistant Extra high strength steel Geometry : 20mm depth corrugated U shape panel.

Gauge: 1.2 mm

Assembly : Continuous welding.

Features : Roof panel will be cylindrically cambered with approx. 5mm at

center to ensure complete water drainage.

3.8. Door and hardware

3.8.1. Door

Material : Weather resistant Extra high strength steel & JIS SPA-H

Geometry: 36mm depth corrugated pressing with peripheral frame of

square tube for vertical and pressed channel for horizontal.

Gauge : Panel-1.2mm, horizontal member - 3.0mm

Vertical member - rectangular tube 40x100x3.2mm

Features : Each door to be capable to open through 270 degrees.

Two locking T.I.R. plates to be welded onto the left and right

hand door center vertical tube respectively.

Assembly : Continuously welding for periphery.

3.8.2. Hinge lug and blade

Material : Lug - JIS SS400, Blade – S25C

Geometry : Hinge lugs are pressed plate.

Hinge blades are forged type.

Features: Bushed with nylon.

Each hinge sits on a 1.6mm stainless steel washer.

Assembly : Hinge blades are fully welded to the door frame and hinge

lugs are fully welded to the rear post outer.

Treatment: Hinge lugs and blades are zinc-plated.

3.8.3. Hinge pin

Material : JIS SUS304 Geometry : 12mm diameter

3.8.4. Locking ass'y

Geometry: Two pronged type cam at each ends.



Size : 34mm outer diameter.

Location Two locking bars per door.

Features Handles are in same level and same direction type.

Treatment: Hot dip galvanized.

Type : Shanghai Haihang or SaeJin or Suraloc type with forged

handle.

3.8.5. Door Holder and Receptacle

A door holder per door, made of hot dip galvanized chains, is tied to the center side locking rod & the receptacle (door hook) is welded to each bottom side rail to remain the door at the open position.

3.8.6. Door seal

Material : E.P.D.M.

Geometry: "J" section except for horizontal bottom "C" shaped lip.

Features Continuous gaskets with vulcanized corner joints.

Assembly : Retained by stainless steel retainer fastened to door frame by

4.8mm stainless steel rivets.

3.9. Flooring

3.9.1. Floor

Material : Laminated oak.

Thickness: 1 1/4"

Density: 750kg/m³

Assembly: The floor boards are fixed to the crossmembers by

zinc-plated tapping screws that are 8mm diameter.

3.9.2. Floor securing devices

Material : Electro zinc plated

Gauge: 8mm diameter with 16mm diameter head countersunk 1.5mm

to 2.5mm below to floor surface.

Treatment : Electro zinc plated.

Features : Screws are staggered upon installation. Every floor board is

fastened by 3 screws to each crossmember, 2 on one side of the web, with 1 in the middle being on the opposite side of the

web.

3.10. Corner fitting

Material: SCW 480



Geometry: The dimensions and locations will be in compliance with

ANSI/AAR standards

3.11.Lashing

Material : JIS SS400, Geometry : 12mm diameter

Location : 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: 14, Total: 56
Lashing rods are welded on each rear & front corner post slot.

Lashing rods Qty. / Each end corner post: 3, Total: 12

Features : Working capacity for lashing rods to be 1500 kg each and for

lashing rings to be 1000 kg each.

Treatment: Zinc-plated.

3.12.Placard

Material : Aluminum,

Location : Subject to AAR M-930-14. Detail location refer to marking

drawing.

Assembly : Be affixed on all four sides with 4.8mm diameter rivets.

3.13. Properties of steel material

The properties of steel material used in construction are as follows.

Y.P(kg/sq.mm)	T.S. (kg/sq.mm)	E. (%)
> 35	> 49	> 22
> 33	> 50	> 22
> 28	> 49	> 20
> 25	> 41	> 21
> 21	> 53	> 40
> 23	> 45	> 19
>71	>76	> 12
>71	>81	> 5
>56	>61	> 14
	> 35 > 33 > 28 > 25 > 21 > 23 > 71	> 33 > 50 > 28 > 49 > 25 > 41 > 21 > 53 > 23 > 45 >71 >76 >71 >81

Y.P.: Yield point; T.S.: Tensile Strength; E.: Elongation



4. Preservation

4.1 Surface Preparation of the Steelwork

- 1) All the steel surfaces prior to forming or after will be degreased and shot blasted to Swedish Standard SA 2.5 to obtain the surface profile of 25 to 35 microns which results in the removal of all rust, dirt, mill scale and all other foreign materials.
- 2) Locking rod assemblies, which are welded with gear cams, bars holder and handle hinges, are hot dipped galvanized.
- 3) All fasteners such as bolts/nuts, washers, self-tapping screws, which are not mentioned in this Spec. will be electro zinc plated.

4) Sealant

Perimeter of the floor, all the overlapped joints of inside, all the holes for bolts and nuts and all the places where may leak water will be sealed to give prevention against water entry.

4.2 Coating

4.2.1 Prior to Assembly

All steel surfaces will be coated with primer paint immediately after shot-blasting.

4.2.2 After Assembly

All weld joints will be shot-blasted to remove welding flux, spatters, burnt primer coatings caused by welding heat, and other foreign materials; this process is then followed with secondary paint operation immediately.

4.2.3 The assembled container will have coating system as follows:

Waterborne paint system:

Process	Paint Name	DFT (μ)
Exterior Surface	Epoxy zinc rich primer	10
	Waterborne epoxy zinc rich primer	20
	Waterborne epoxy primer	50

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	Waterborne polyurethane topcoat	40
	Color : Pantone 288C Blue	
	Total	: 120
Interior Surface	Epoxy zinc rich primer	10
	Waterborne epoxy zinc rich primer	20
	Waterborne FDA grade epoxy topcoat	50
	Color: RAL 7035	
	Total	: 80
Under Structure	Epoxy zinc rich primer	10
	Waterborne epoxy zinc rich primer	20
	Waterborne asphalt	150
	Total	: 180

^{*} Epoxy zinc rich primer and epoxy topcoat are not applied to the wooden floor.

For each area, and coat, less than 10% of the readings may be below the DFT specified. No readings may be below 90% of the DFT specified. Areas where the total DFT is more than twice the DFT specified are not acceptable and must be redone completely.

The paint supplier is Dowill or Valspar or PPG.

5. Markings

5.1 Lettering

The markings will be designed and arranged according to AAR and owner's requirements. The markings consist of the following contents:

- 1) Owner's emblem / logos according to owner's design.
- 2) Owner's code and serial number (outside & inside)
- 3) Other marking: According to owner's requirements.
- 4) Material of marking: Logo-5018-3M cast vinyl film,

Others- 3M cast vinyl film (Not including reflective tape)

- 5) Supplier of markings: "New Century", "Ocean Shine", "New sunshine", Graphictech" etc.
- 6) Reflective tape: "3M" or "ALFETY" products with "DOT-C2" grade.

5.2 Certification Plate

^{*} The DFT decision rules in practice is 90-10:



The containers will bear marking plate in accordance with the requirements of the AAR M-930-14. The plate will be 76 x 102 mm, and permanently riveted to the lower right hand corner of the blind end of the container by rivets and sealant.

Plate material : Stainless steel

Plate treatment : Chemically etched & enameled

Rivets material : Stainless steel

Plate thickness : 0.8 mm

The plate will be bear the following words:

"Meets AAR M-930-14" and "CG is inches"

6. Testing and Inspection

6.1 Proto-type Container

Proto-type container to be manufactured in accordance with this specification and shall be tested according to procedures described in the AAR M-930-14 requirements. The containers will be fabricated & tested in advance of the mass production. Certification Society report is available upon request.

6.2 The proposed criteria table for general prototype testing:

Container must be able to pass satisfactorily the tests described in this section. Upon completion of testing, the container must remain serviceable and have no test-induced visible or measurable permanent deformation in any portion of the structure.

	Test No.	Test Load	Method
a.	Yard Stacking	Internal Load: R-T	Hydraulic cylinder load to intermediate
		Testing load:	corner post through top handling fittings,
		0.75 R/post	support at intermediate handling fittings
		(3 high stacking in yard)	Time duration: 5 mins.
b.	Train Stacking	Internal Load: R-T	Hydraulic cylinder load to intermediate
		Testing load:	corner post through top handling fittings,
		0.5 R/post	support at intermediate handling fittings
		(Double stacking at train)	Time duration: 5 mins.
C.	Lifting from the	Internal Load: 2R-T	Test load to be uniformly distributed on
	Тор		the floor.

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			Lifting vertically from four top handling fittings.
			Time duration: 5 mins.
d.	Restraint	Internal Load: R-T	Hydraulic cylinder load applied to the
	(Longitudinal)	Testing load:	bottom side rails through the bottom
		2R (R/side)	aperture of the bottom handling fittings.
			Compression at 40' and 53' position,
			Tension at 40' position.
	<u> </u>		Time duration: 5 mins .
e.	Restraint	Internal Load: R-T	Hydraulic cylinder load applied to the sill
	(Transverse)	Testing load: 0.3R	bottom side rails through the bottom sill
			aperture of the bottom handling fittings
			in compression & then tension at 40'
			position.
f.	Front End Wall	Test Load: 0.4 P	Time duration: 5 mins .
١.	Strength	Test Load. 0.4 P	Compressed air bag is used. Time duration: 5 mins.
g.	Rear End Wall	Test Load: 0.4 P	Compressed air bag is used.
g.	Strength	Test Load. 0.41	Time duration: 5 mins.
	Rear End Wall	Test Load: 0.7 P	Compressed air bag is used.
h.	Strength	Tool Eddd: 0.7 T	Time duration: 5 mins.
	Side Wall	Test Load: 0.3 P	
١.	Strength	rest Load. 0.5 F	Compressed air bag is used. Time duration: 5 mins.
i -	Roof Strength	Test Load: 170 kg	Applied area will be the weakest place of
J.	Roof offerigin	(375 lbs)	610 x 305 mm longitudinal & transverse.
		(070 103)	Time duration: 5 mins .
k.	Ultimate Strength		19,780kg(43600 lbs) uniformly
	Floor Test		distributed over mid area of
			3m(long)x1.2m(wide). The balance load
			of 2(R-T-9890)kg to be distributed over
			remain floor area.
			Time duration: 5 mins
l.	Floor Deflection	Internal Load: R - T	The rating uniformly distributed over the
	Test		floor, its base structure will not below the
			bottom of the lower handling fittings.
			Time duration : 5 mins
m.	Lift Truck Test of	Floor rating: 10,890 kg	The floor system structure will be
	Container on	(24,000 lbs)	physically tested in accordance with



	Chassis		TTMA Recommended Practice RP-37,
			latest revision.
			Appendix A, Specification M-931.
n	Racking	Test Force:	Hydraulic cylinder load will applied to
	(Longitudinal)	15,240 kg	side top rail through the top handling
		(33,600 lbs)	fittings.
			Time duration : 5 mins .
0	Lifting the from	Internal load 1.7R-T	The container supported equally on 4
	Bottom		shoes, each having a bearing area of
			4"X18".
			Time duration : 5 mins .
р	Racking Fatigue	Test Force: vertically	Hydraulic cylinder load will applied to the
	(Transverse)	applied force 0.35R	intermediate fram through the top
		per post ,	handling fittings.
		Transverse force 0.15R	Time duration : 2500 cycles .
		per side)	
q	Fatigue Testing of	Internal load R-T	Lifting vertically from four top handling
	Lifting from the	Test Force: vertically	fittings, but pressure must be applied to
	top	applied force 3,970kg per	top handing fitting before lifting.
		post	Time duration : 3000 cycles
r	Weather	Nozzle:	Distance: 1.5 m
		12.5 mm (inside dia.)	
	proofness	Pressure:	Speed: 100 mm/Sec.
		100 kpa (1 kg/sq.cm)	

* Note: R - Maximum gross weight

T - Tare weight P - Maximum payload

6.3 Inspection

6.3.1 Materials and Component Parts Inspection

All the materials and components will be inspected by Quality Control Dept. to assure that the most suitable and proper components are used for the containers to meet this specification.

6.3.2 <u>Production Line Inspection</u>

All containers will be manufactured under effective Quality Control procedures, and every production line of the factory will be inspected and controlled by the Quality Control Dept. to meet this specification.



7. REVISION LIST

Dec.01, 2020 revised:

- 1. Change the coating system to the waterborne paint system.
- 2. Change the A-Tracks to Ancra tracks.

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