



Technical Specification

for a special

20' x 8' x 8'6" ISO Type

Dry Cargo Steel Container

("TWORTY BOX")

Drawing No.: Tworty 1, 2 and 3

Date of Issue: Aug. 31, 2007



Scope

This specification covers the design, construction, materials and testing of two prototype containers of special type ("Tworty Box") individually marked as

TWYU 240001 0 and TWYU 240002 6.

The containers have doors at each end, the additional door opens to the inside and can only be locked from the inside. This door is capable of swinging 90° to the container ceiling and to be fixed to the ceiling. The containers can either be used as single 20 ft containers or two containers of this type can be coupled together, thereby creating a 40ft container of full value, i.e. a single volume of 40 ft length with doors at both ends.

The containers have been built as standard dry cargo steel containers in accordance with the requirements of ISO 1CC Type steel dry freight containers by China International Marine Containers (Group) Limited (CIMC) as BCHU 209069 1 and BCHU 209022 2 for Braun Container Handels GmbH, Hamburg/Germany, and have been subsequently converted by Drehtainer GmbH, Zarrentin/Germany, for TWORTY BOX GmbH & Co. KG, Hamburg/Germany.

The design is protected by international patents.

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1 GENERAL

1.1 Operational Environment

The containers are designed and constructed for the transportation of general cargo on sea (above or under deck) and on land (road or rail) throughout the world, and will be suitable for the environmental conditions imposed by those 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 water tightness.

1.2 Standards, Regulations and Rules

1.2.1 Standards and Regulations

The containers comply with following in their latest editions:

- 1) ISO/TC-104
 - 668 - Series 1 freight containers-Classification, external dimensions and ratings
 - 6346 - Coding, identification and marking for freight containers
 - 1161 - Specification of corner fittings for series 1 freight containers
 - 1496/1 - Specification and testing of series 1 freight containers.
Part 1: General cargo containers for general purposes
 - 830 - Freight containers-Terminology.
 - 3874 - Freight containers-Handling and securing
- 2) The International Union of Railway (UIC) code 592-2 OR.
- 3) The Customs Convention on the International Transport of Goods (TIR).
- 4) The International Convention for Safe Containers (CSC).
- 5) Transportation Cargo Containers and Unit Loads Quarantine Aspects and Procedures by Commonwealth of Australia Department of Health (TCT).

1.2.2 Rules

The containers comply with the rules of GL Classification.

2 APPROVAL AND CERTIFICATES

2.1 Classification Certificate

The containers are certified for design type and individually inspected by Classification Society.

2.2 Production Certificate

The Production Certificate of series containers to be issued by the Classification Society. The Society's seal to be provided.

2.3 TCT Certificate

Certificate of timber treatment to the requirement of Australia Department of Health.

2.4 Customs Certificate (TIR)

Customs' Approval and Certificate to be issued by the Customs.

2.5 UIC Registration

Containers will be registered and comply with the International Union of Railways.

2.6 CSC Certificate

Containers are certified and comply with the requirements of the International Convention for Safe Containers.

3 HANDLING

The containers are constructed to be capable of being handled either separately or coupled 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 the top corner fittings vertically by means of spreaders fitted with hooks, shackles or twistlocks.
- 2) Lifting, full or empty, at the bottom corner fittings using slings with appropriate terminal fittings at slings angle of forty-five (45) degrees to horizontal.
- 3) Lifting, full or empty, at two fork pocket by fork lift truck (**not in coupled condition!**)

4 TRANSPORTATION

The containers are constructed to be suitable for transportation for following modes without any permanent deformation which will render the container unsuitable to use or any abnormality.

4.1 Marine:

- In the ship cell guides: Seven (7) high stacked, and vertical acceleration limit: 1.8 g (max. gross weight 30,480 kg)
- On the deck: Four (4) high stacked and secured by suitable vertical and diagonal wire lashings (max. gross weight 30,480 kg)

4.2 Road - On flat bed or skeletal chassis:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

4.3 Rail - On the flat cars or special container car:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

5 DIMENSIONS AND RATINGS

5.1 Dimensions

Uncoupled (20ft):

	External Dimensions	Internal Dimensions
Length.....	6,058 (0, -6) mm	5,892 (0, -6) mm
Width.....	2,438 (0, -5) mm	2,352 (0, -5) mm
Height.....	2,591 (0, -5) mm	2,393 (0, -5) mm

Coupled (40ft):

	External Dimensions	Internal Dimensions
Length.....	12,192 (0, -10) mm	11,986 (0, -10) mm
Width.....	2,438 (0, -5) mm	2,352 (0, -5) mm
Height.....	2,591 (0, -5) mm	2,393 (0, -5) mm
below front door in upward position		2,260 (0, -5) mm

No part of the container protrudes out beyond the external dimensions mentioned above. Maximum allowable difference between two diagonals on any one of the following surface are as follow:

Roof, Bottom and Side Diagonals.....	13 mm
Front and Rear Diagonals	10 mm

5.2 (Standard-) Rear Door Opening

Width.....	2,340 (0, -5) mm
Height.....	2,280 (0, -5) mm

5.3 (Additional-) Front Door Opening

Width.....	2,300 (0, -5) mm
Height.....	2,245 (0, -5) mm

5.4 Fork Pocket

Width.....	360 mm
Height.....	115 mm
Center distance.....	2,080 mm

5.5 Inside Cubic Capacity

Uncoupled (20 ft).....	33.1 cu.m	1,164 cu.ft
Coupled (40 ft)	63.5 cu.m	2,242 cu.ft

5.6 Rating

Uncoupled (20ft):	Maximum Gross Weight	30,480 kg	67,200 lbs
	Tare Weight.....	2,650 kg	5,842 lbs
	Maximum Payload.....	27,830 kg	61,358 lbs
Coupled (40ft):	Maximum Gross Weight	30,480 kg	67,200 lbs
	Tare Weight.....	5,300 kg	11,684 lbs
	Maximum Payload.....	25,180 kg	55,516 lbs

5.7 Corner Protrusions

- 1) The upper faces of the top corner fittings protrude above the highest level of the roof construction except corner plate by 6 mm.
- 2) For the containers under empty condition the lower faces of the cross members in their bases including their end transverse members are on a plane located at 12.5 (+5, -1.5) mm above the lower faces of the bottom corner fittings except the corner plates.
- 3) The outer side faces of the corner fittings protrude from the outside faces of the corner post by minimum 3 mm for side structure and 4 mm for front end structure. The outer side faces of the corner fittings protrude from the outside faces of the side walls by nominal 7 mm and from the outside faces of the end wall by 7.4 mm.
- 4) For the containers under the condition such as the load equal to 1.8R - T is uniformly distributed over the floor, no part of the container base deflect by more than 6 mm below the lower faces of the bottom corner fittings.

6 CONSTRUCTION

6.1 General

The containers are constructed with steel frames, fully vertically corrugated steel side and end walls, die-stamped corrugated steel roof, wooden flooring, corrugated triple hinged front door (to be pivoted under the ceiling), corrugated double hinged rear doors and ISO corner fittings at eight corners.

6.2 Corner Fittings

Corner fittings are designed in accordance with ISO/1161 standard, and manufactured at the workshops approved by the Classification Society.

6.3 Base Frame

The base frame is composed of two (2) bottom side rails, a number of cross-members and a pair of fork pockets, which are welded together as a sub-assembly.

6.3.1 Bottom Side Rail

Each bottom side rail is built of a steel pressing made in one piece. The bottom flange face outwards so as to be easily repaired and hard to corrode.

Qty.: 2
 Shape:.....Channel section
 Dimension: 162 x 48 x 30 x 4.5 mm

In the course of conversion both bottom side rails have been reinforced by steel bars 100 x 10 mm

6.3.2 Crossmember

The crossmembers are composed of a number of small pressed channel section and some large ones located beneath each board joint of the plywood.

Shape:....."C" section
 Small one: 122 x 45 x 45 x 4.0 mm, Qty.: 13
 Large one: 122 x 75 x 45 x 4.5 mm, Qty.: 2

6.3.3 Fork Pocket

One pair of fork pockets is provided in according with ISO requirements for loaded handling (in uncoupled condition only).

Top plate thickness: 4.0 mm
 Mouth plate thickness: 6.0 mm Depth: 200 mm
 Side rail ("C" section): 122 x 45 x 45 x 4.0 mm

6.3.4 Reinforcement

Reinforcement plate is welded to each end of bottom side rail.

Dimension: 200 x 153 x 4.5 mm

6.4 Front End

The front end is composed of a front end frame, which consists of one door sill, two corner posts, one front header with header plate and four corner fittings, which are welded together as a sub-assembly, and a one leaf Door System which is equipped with inside locking devices to be opened to the inside. From the outside a surrounding groove for the rubber seal ring is incorporated into the front end frame.

Groove: 19 x 30 mm

6.4.1 Door Sill

The door sill is built of a special channel section steel pressing. Two bonding elements are incorporated in the door sill adjacent to the bottom fittings thereof one is equipped with a bolt and the other of socket type.

Door sill: 5 mm thick

6.4.2 Corner Post

Each corner post is constructed from two inner parts of channel steel pressings, one inner part a steel bar and an outer part, welded together to form a hollow section.

Inner parts: 59 x 35 x 5; 60 x 39 x 5 and 70 x 30 mm
Outer part: 242 x 38 x 6.0 mm thick

6.4.3 Door Header

The door header is constructed from a lower part of steel pressing and an upper part of steel pressing rear header plate, they are welded together to form a section to provide a high rigidity.

Front header: 5.0 mm thick
Header plate: 5.0 mm thick

Two bonding elements are incorporated in the door header adjacent to the bottom fittings thereof one is equipped with a bolt and the other of socket type.

6.4.4 Door System

Door consists of one door leave with six locking devices, three hinges and seal gaskets. The door is installed by hinge pins to the door header and is capable of swinging 90 degrees to the ceiling smoothly.

6.4.4.1 Door Leave

The leaf consists of door panel, steel door frame which consists of horizontal (upper & lower) and vertical (inner & outer) part. They are welded together to form the rectangular door leave.

Door Panel:

Thickness: 2.0 mm

Corrugation dimensions: Depth: 45.6 mm

Door Frame:

Vertical door member: 150 x 50 x 4 mm RHS

Horizontal door member: 150 x 50 x 4 mm RHS

6.4.4.2 Hinges

Three forged hinges, provided with bushed hole, are welded to the door frame at the top. The door is installed by hinge pins, washers and bushings.

Washer:	Material: Brass/Stainless steel
Location:	Under the bottom of hinge
Bushing:	Self-lubricating synthetic
Pin:	Material: Stainless steel

6.4.4.3 Locking Devices

Six locking bars are fixed from the inside to the vertical parts of the door frame with cam-keepers welded to the corner post (three at each post).

6.4.4.4 Door Seal

The front door seal is fixed to the front frame and is of foamed caoutchouc (self adhesive)

6.4.4.5 Winch

The front door is operated by cable pulls to open it to the upward-pivoted position. A worm-gear with two rope drums is fixed behind the door header in its center in such a way that it is recessed behind the door header. The worm-gear is operated manually by a detachable crank.

Transmission ratio: 20 : 1

Two cables are guided from the center of the rear door header each of them guided to one corner post and further guided alongside the top rail to a position with a distance of the front doors height to the front frame.

Cabel guidance is by pulleys.

6.5 Rear End

Rear end is composed of Rear End Frame which consists of one door sill, two corner posts, one rear header with header plate and four corner fittings, which are welded together as a sub-assembly, and Door Systems which are with locking devices.

6.5.1 Door Sill

The door sill is built of a special channel section steel pressing with internal ribs as stiffeners at the back of each cam keeper. The upper face of the sill has a slope for better drainage and the highest part is on the same level to the upper face of the wooden floor. Two channel section steel recesses are provided in the door sill adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Door sill:4.5 mm thick Slope: 1 : 10 approx.
Stiffener ribs: 4.0 mm thick Qty.: 4 Pcs.
Channel section:200 x 75 x 9 mm

6.5.2 Corner Post

Each corner post is constructed from an inner part of channel shaped hot-rolled section steel and an outer part, welded together to form a hollow section to ensure suitable strength against the stacking and racking force. Four (4) sets of hinge pin lugs are welded to each outer part of the corner post.

Inner part:..... 113 x 40 x 10 mm
Outer part:..... 6.0 mm thick

6.5.3 Door Header

The door header is constructed from a lower part of a "U" shaped steel pressing with four internal stiffener ribs and an upper part of steel pressing rear header plate, they are welded together to form a box section to provide a high rigidity.

Rear header: 4.0 mm thick
Header plate:..... 4.0 mm thick
Stiffener ribs:4.0 mm thick, Qty.: 4

6.5.4 Door Systems

Doors consist of two door leaves, each leaf with two locking devices, four hinges and pins, seal gaskets and the door holders. The doors are installed by hinge pins to the rear end frame and capable of swinging to 270 degrees smoothly.

6.5.4.1 Door Leaves

Each leaf consists of door panel, steel door frame which consists of horizontal (upper & lower) and vertical (inner & outer) members. They are welded together to form the rectangular door leaf. The door are so arranged that the left leaf can not be opened without displacement of the right leaf.

Door Panel: With 3 corrugations

Depth:45.6 mm Slope: 32 mm

Width:..... 70 mm Panel thickness: 2.0 mm

Door Frame:

Vertical door member: 100 x 50 x 3.2 mm RHS (outer & inner)

Horizontal door member:.....150 x 50 x 3.2 mm, channel section

6.5.4.2 Hinges and Pins

Four forged hinges, providing with bushed hole, are welded to each door leaf. Each door is installed by hinge pins, washers and bushings.

Washer:	Material: Brass/Stainless steel
Location:	Under the bottom of hinge
Bushing:	Self-lubricating synthetic
Pin:	Material: Stainless steel.

6.5.4.3 Locking Devices

Two locking bars are of steel tube with forged handles, anti-racking rings and cam ends, and fixed to each door leaf with bolts / nuts and six huck bolts at TIR locations, by top and bottom bearing brackets and one bar guide bracket. The bars are suspended in bearing brackets with bush of self-lubricating synthetic material. The turn direction of the locking handles will be single direction for each door.

Cam-keepers are welded to the door header and sill.

Locking device type: SJ-13BF or HH-E with segura cam and keeper.

Locking bars treatment: Hot-Dipped galvanized (75 Microns)

6.5.4.4 Seal Gaskets

The door seal gaskets (black colour) are of EPDM rubber assembled by rivets, using strip retainers and adhesive sealant on the back.

Gasket's shape:	"J-C" Type
Retainer:	Stainless steel
Rivet:	Stainless steel

6.5.4.5 Door Holder and Receptacle

A door holder per door, made of mixed nylon rope, is tied to the center side of locking rod and the receptacle (hook type) is welded to each bottom side rail to remain the door at the open position.

6.5.4.6 Shim

The EPDM shim is placed over the holes on the door for fastener.

6.6 Side Wall Assembly

6.6.1 Top Side Rails

Each top side rail is made of a square steel pipe.

Rail: 60 x 60 x 3.0 mm RHS

Both rails have been reinforced by steel bars; LS-steel 75 x 50 x 7 mm

6.6.2 Side Walls

Each side wall is composed of a number of sheets for the intermediate (inner) parts and outer panels at each end of side wall, fully vertically corrugated into trapezium section, butt welded together to form one panel by automatic welding.

- | | | |
|---------------------------|--------|------------------|
| a) Outer panel thickness: | 2.0 mm | Qty.: 2 Pcs/side |
| b) Inner panel thickness: | 1.6 mm | Qty.: 3 Pcs/side |
| c) Trapezium - Depth: | 36 mm | |
| Outer face: | 72 mm | Slope: 68 mm |
| Inner face: | 70 mm | Pitch: 278 mm |

6.7 Roof

The roof is constructed by several die-stamp corrugated steel sheets with a certain upwards camber at the center of each trough and corrugation, these sheets are joined together to form one panel by automatic welding.

Corrugation Shape -	Depth:	20 mm	Pitch: 209 mm
	Inner face:	91 mm	Slope: 13.5 mm
	Outer face:	91 mm	
	Camber upwards:	5 mm	
Panel thickness:	2.0 mm		
Sheets Qty.:	5 Pcs.		

6.7.1 Roof reinforcement plate

Four reinforcement plates are mounted around the four corner fittings.

Dimension: 350 x 270 x 3.0 mm

6.8 Floor

6.8.1 The Floor Boards

The floor consists of plywood. The plywood is treated with preservative according to the latest requirement of Commonwealth Department of Health, Australia.

Plywood thickness:..... 28 mm
 Plywood moisture content:Less than 14 %
 Plywood plies Qty.:..... Min.19 plies
 Plywood material:..... Apitong/Hardwood

6.8.2 Arrangement and Fixing

The plywood boards are longitudinally laid on the crossmember with a pre-blasted painted and free floating flat steel at the center, two angle steel along both side rails. The plywood boards are tightly secured to each crossmember with countersunk self-tapping electro-zinc plated steel screws.

These heads of the floor screws are countersunk below the level of the upper surface of the floor by 1.5 mm to 2.5 mm.

Screws: M8 x 45 x Φ 16 (head), Electro zinc plated
Screw's Qty.: 6 Pcs/joint, 5 Pcs/other
Floor centre rail: 50 x 4 mm, Primed and painted
"L" section: 2.3 mm thick

6.9 Bonding Elements

Two bonding elements are integrated in the door sill and the door header respectively of the front end each adjacent to a corner fitting. Each bonding element consists out of a connecting and a socket element.

6.9.1 Connecting Element

The connecting element is designed with a connecting shaft and a spacer. The locking end is held by the connecting shaft which extends through an essentially sleeve shaped spacer. The spacer is provided with an external profile to ensure the distance between the two containers (76 mm) according to ISO regulations.

Diameter connecting shaft:..... lower 45mm; upper 33 mm

In uncoupled condition the shaft and the spacer are retracted in the connecting element. For the coupling the shaft is pushed out of the housing from the inside of the container inserted in the socket element of the other container, turned for locking by 90 degrees and then screwed tight by turning the striking nut.

6.9.2 Socket Element

The socket has an insertion opening to allow the locking end of the connecting shaft into the insertion opening but cannot be pulled back out of the insertion opening after it has been turned by 90 degrees.

6.10 Rubber Seal

The rubber seal is designed as a closed sealing ring consisting out of two layers of elastomeric base material. Stiffening metal plates measuring 100 x 50 mm are embedded between the layers. The distance between to plates is 20 mm to allow the folding of the seal.

Perimeter 9,400 mm
Width..... 155 mm
Thickness (two layers)..... 16 mm

If not in use each container carries one rubber seal under its ceiling in special holders adjacent to the top rail (only one rubber seal is needed for the coupling of two containers).

6.11 Special Features

6.11.1 Crossing Sheet

In coupled condition a crossing sheet can be layed across the gab in the floor between the coupled containers to enable smooth forklift operation. If not used the crossing sheet is stored in a corrugated panel of the side wall secured by a bolt not affecting the internal width of the container.

Length crossing sheet 1,145 mm
Width..... 182 mm
Thickness..... 4 mm

6.11.2 Door Stopper

At the upward position of the front door the cables can be eased as the door is held by door stoppers fixed at both side rails.

6.11.3 Customs Seal Provision

Customs seal devices are made on each locking handle and retainer in accordance with TIR requirements with rivets.

6.11.4 Lashing Rings

- 1) Lashing rings are welded to each bottom and top side rail at corresponding recessed area of side wall at equal distance.
Lashing rings' Qty./ Bottom or top side rail: 5, Total: 20
- 2) Lashing bars are welded in each front and rear corner post in each slot:
Lashing bars' Qty. / Corner post: 3, Total: 12
- 3) Capabilities of pull load of every lashing point are as following:
 - a) Lashing rings on the side rails: 1,500 kg/each
 - b) Lashing bars on the corner post: 1,500 kg/each
- 4) Lashing ring/bar's surface treatment: Electro-zinc plated (13 µ)

6.11.5 Ventilator

One ventilator is attached to each side wall at the right hand end when facing the side from outside of the unit, fixed by three aluminum huck bolts, the seal is to be applied on the edges except the bottom side of the ventilator, after the completion of paint.

Quantity: 1 / each side panel, Material: ABS Labyrinth Type.

7 PRESERVATION

7.1 Surface Preparation of the Steelwork

- 1) All the steel surface prior to forming or after will be degreased and shot blasted to Swedish Standard SA 2.5 to obtain the surface roughness at 25 to 35 μ which can result in the removal of all the 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 dipping galvanized (Thickness: 75 μ).
- 3) Hinges, cam keepers will be electro zinc plated (Thickness: 13 μ).
- 4) All fasteners not mentioned in this Spec., such as bolts, nuts self-tapping screws will be electro zinc plated (Thickness: 13 μ).
- 5) Sealant
Each 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 are sealed to give prevention against water entry.
Sealant Materials: a) Chloroprene (Cargo contact area)
 b) Butyl (Hidden parts)

7.2 Coating

7.2.1 Prior to Assembly

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

7.2.2 After Assembly

All the weld joints are shot-blasted to remove all the welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials, and followed with the secondary paint operation immediately.

7.2.3 Coating system

Process	Paint Name	DFT (μ)
Exterior Surface	Epoxy zinc rich primer	30
	Epoxy primer	40
	Acrylic topcoat	50
	Total:	120
Interior Surface	Epoxy zinc rich primer	30
	Epoxy topcoat, RAL7035	40
	Total:	70
Under Structure	Epoxy zinc rich primer	30
	Bitumen (Tectyl 121B, IVAN512 or ACST5808)	200
	Total:	230

Epoxy zinc rich primer and Epoxy topcoat are not applied to the wooden floor.
Exterior Surface Color: RAL 5010

The paint supplier is Hempel.

8 MARKINGS

8.1 Lettering

The markings consist of the following contents:

- 1) Owner's emblems on both side walls
- 2) Owner's code, serial number and check digit (outside & inside)
- 3) Size and type code (outside)
- 4) Weight details (on door)

8.2 Consolidate Plate

8.2.1 Marking Plates

The containers bear marking plates in accordance with the requirements of the Classification Authorities and owner such as mentioned in section 2.2 in this specification. The plate will be permanently riveted to the specified position by rivets and sealant.

Plate material: Stainless steel
Plate treatment: Chemically etched & enameled
Rivets material: Stainless steel
Plate thickness: 0.8 mm

8.2.2 Contents of the Plate:

- 1) Owner's plate (name and address).
- 2) CSC approval No. D-MV-0065
- 3) Customs approval No. DE-9101-070-2007
- 4) Australian wood treatment.
The engraved letters on this plate are as following:
IM: Immunization
- 5) Date of manufacture (year and month – engraved or stamped)
- 6) Owner's serial number (stamped)
- 7) Owner's model number

9 TESTING AND INSPECTION

9.1 Prototype Container

Prototype containers are manufactured and converted in accordance with this specification and tested according to procedures described in the ISO 1496/1 and the Classification Society's requirements.

9.2 The criteria table for general prototype testing:

Test No.	Test Load	Method
a. Stacking	Internal Load: 1.8R-T Testing load: 86,400 kg/post	Hydraulic cylinder load to corner post through top corner fittings. Time duration: 5 mins.
b. Lifting from Top Corner Fittings	Internal Load: 2R-T	Lifting vertically from top corner fittings. Time duration: 5 mins.
c. Lifting from Bottom Corner Fittings	Internal Load: 2R-T	Lifting from bottom corner fitting 45 Deg. to horizontal. Time duration: 5 mins.
d. Lifting from Fork Pocket	Internal Load: 1.6R-T	Lifted by horizontal bars. Bar length: 1828 mm, Bar width: 200 mm, Time duration: 5 mins.
e. Restraint (Longitudinal)	Testing load: 2R(R/side) Internal Load: R-T	Hydraulic cylinder load applied to bottom side rails in compression & then tension. Time duration: 5 mins.
f. Floor Strength	Truck Load: 7,260 kg	Special truck is used. Total contact area : 284 sq cm, Wheel width : 180 mm, Wheel center distance: 760 mm
g. Wall Strength (Front & Door)	Test Load: 0.4 P	Compressed air bag is used. Time duration: 5 mins.
h. Side Wall Strength	Test Load: 0.6 P	Compressed air bag is used. Time duration: 5 mins.
i. Roof Strength	Test Load: 300 kg	Applied area will be the weakest place of 600 x 300 mm longitudinal & transverse. Time duration: 5 mins.
j. Rigidity (Transverse)	Test Force: 15,240 kg (150 kN)	Hydraulic cylinder will be applied to front top end rail & door header through top corner fittings, each time pulling & pushing. Time duration: 5 mins.
k. Rigidity (Longitudinal)	Test Force: 7,620 kg (75 kN)	Hydraulic cylinder load will applied to side top rail through top corner fittings. Time duration: 5 mins.
l. Weather proofness	Nozzle: 12.5 mm (inside dia.) Pressure: 100 kpa (1 kg/sq.cm)	Distance: 1.5 m Speed: 100 mm/Sec.

Note : R - Maximum gross weight, T - Tare weight, P - Maximum payload

10 MATERIALS

The main materials used in construction are as follows or approved equivalent :

Where used	Materials
<u>Front End Assembly</u>	
Front corner post	Corten A and S 355J2G3
Door sill	Corten A
Door header lower	Corten A
Front header cap	Corten A
Door panel frame	Corten A
Door panel	Corten A
Door hinge	S 20 C
Door hinge pin	Stainless steel
Locking cam, cam keeper	Corten A
Door gasket	Foamed caoutchouc self adhesive
Front sill	Corten A
Front panel	Corten A
Front header cap	Corten A
Front rail	Corten A
<u>Base Assembly</u>	
Bottom side rail	Corten A
Crossmember	Corten A
Gooseneck tunnel	Corten A
Outrigger	Corten A
Floor centre rail	Corten A
Floor support angle	Corten A
<u>Rear End Assembly</u>	
Rear corner post (outer)	Corten A
Rear corner post (inner)	SM50YA (or SS50)
Door sill	Corten A
Door header lower	Corten A
Rear header cap	Corten A
Door panel frame	Corten A
Door panel	Corten A
Door hinge	S20C
Door hinge pin	Stainless steel
Locking cam, cam keeper	S20C
Locking rod	STKR41
Door gasket	EPDM
Gasket retainer	Stainless steel
Washer	Brass/Stainless steel
Rivet	Stainless steel
Shim	EPDM
Corner fitting	SCW49

Where used	Materials
<u>Side Wall Assembly</u>	
Side panel	Corten A
Top side rail	Corten A
Lashing bar, lashing ring	SS41, Electro zinc plated
Ventilator	ABS
<u>Roof</u>	
Roof corner gusset	Corten A
Roof panel	Corten A
<u>Floor</u>	
Floor board Plywood	(Apitong/Hardwood)
Floor screw	Electro zinc plated

Note:

Material	Yield point (Kg/sq.mm)	Tensile strength (Kg/sq.mm)
SS41	25	41
JIS SCW49	28	49
SS50	29	50
S20C	25	42
SM50YA	37	50
Corten A	35	49
SM50A	33	50