

TECHNICAL SPECIFICATION

FOR

40' X 8' X 8'6" TYPE
STEEL DRY CARGO CONTAINER

WITH

ALL CORTEN

CORRUGATED DOOR
CORRUGATED ROOF
GOOSENECK TUNNEL
2 VENTILATORS
PLYWOOD FLOOR

FOR

Star House Co, Ltd

SPECIFICATION NO. : SH-UTGF-40GP
MODEL NO. : SH-STDT-40GP
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SCOPE

This specification covers the design, construction, materials, testing, inspection and performance requirements for steel dry cargo containers manufactured by anyone of the factories belong to Star House (hereinafter referred to as FACTORY).

The containers specified herein are manufactured under the quality control of FACTORY within the perimeters as such set forth by the Classification Societies.

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1. GENERAL

1.1 Operational Environment

The container is designed and manufactured for the carriage of general cargo by marine, road, and rail. It is designed to maintain its structural and weathertight integrity within a temperature range of -30 °C to 80 °C.

1.2 Regulations and Standards

The container will conform to and satisfy the following standards.

1.2.1 ISO/TC-104

All to meet series 1 freight containers set forth.

ISO 830 ----- Freight containers-Terminology.
ISO 668 -----Series 1 freight containers-Classification, external dimensions and ratings.
ISO 6346 ----- Freight containers-Coding, identification and marking.
ISO 1161 ----- Series 1 freight containers-Corner fittings-specification.
ISO 1496-1 -----Series 1 freight containers-Specification and testing-
Part 1 : General cargo containers

1.2.2 T.I.R. Requirements and Certifications

The container shall comply with the customs convention of containers, 1972 and all subsequent revisions to date and will be identified with appropriate approval plates and markings.

1.2.3 Timber Component Treatment and Certification

All exposed timber components are treated with an Australian government approved insecticide and the container will be such identified with appropriate immunization plate.

1.2.4 CSC Requirements

The container will comply with the rules set forth in the International Convention for Safe Containers and will be so identified with a plate.

1.2.5 Classification Society

The container will be certified by classification society in design and individually during its production.

1.3 Handling

The container will be constructed to be handled under the following conditions without distortion or effect on its structural integrity:

- A. Lifting full by its top corner fittings by means of spreaders
- B. Lifting full by its bottom corner fittings by means of fitting at a sling angle of 30 degrees.

1.4 Transportation

The container will be constructed to be suitable for transportation in normal operating conditions by modes of:

- A. Marine - on deck or in cell guided by vertical or diagonal lashings
- B. Rail - on flat or container car secured at its bottom corner fittings
- C. Road - on flat or chassis secured at its bottom corner fittings

2. DIMENSIONS AND RATINGS

2.1 Dimension

Title		40'
External (mm)	Length	12,192 (0, -10)
	Width	2,438 (0, -5)
	Height	2,591 (0, -5)
Internal (mm)	Length	12,032 (0, -10)
	Width	2,352 (0, -5)
	Height	2,393 (0, -5)
Door opening (mm)	Width	2,343 (0, -5)
	Height	2,280 (0, -5)

2.2 Diagonal Difference

Diagonal tolerance of front and rear frames should be less than 10 MM
 Diagonal tolerance of side and roof panels should be less than 19 MM

2.3 Internal Capacity

67.8 CU.M. (2,394 CU.FT.)

2.4 Gooseneck Tunnel

Length 3,316 mm
 Width 1,029 (+3, 0) mm
 Height 120 (0, -3) mm

2.5 Ratings

Title	KGS	LBS
Max. Gross Weight	30,480	67,200
Tare Weight (±2%)	3,740	8,245
Max. Payload	26,740	58,955

2.6 Corner Protrusions

- 2.6.1 The faces of the bottom corner fittings protrude from lowerfaces of all transverse members in the base of the container by 14.5 MM (+3,-3.5MM).
- 2.6.2 The upper faces of top corner fittings protrude from upper faces of the highest point of the roof by 6 MM.
- 2.6.3 The outer side faces of corner fittings protrude from outside faces of corner posts by 3 MM.
- 2.6.4 Under 1.8 x max. gross weight no part of the base will protrude more than 6 MM below the bottom corner fittings.

3. MATERIAL AND CONSTRUCTION

3.1 General

The container is mainly constructed with steel frames, corrugated panels welded by CO₂ shielded Arc welding. All welds of the exterior including the base frames are continuous with full penetration. Wooden floor is fixed to the cross members by self-tapping screws. All crevices will be sealed with elastic sealing compound.

3.2 Materials

The main constructional materials are shown in Appendix A of the specification.

3.3 Corner Fittings

All corner fittings used will comply with ISO/1161 standard.

3.4 Base Structure

The base structure will be composed of two (2) bottom side rails, a number of crossmembers and one set of gooseneck tunnel and outriggers, which are welded together as a sub-assembly.

3.4.1 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. Eight lashing ring (Φ 12mm) are welded to each side of bottom side rail.

Qty. : 2 pcs
Shape : Channel section
Dimension : 158 x 50 x 30 x 4.5 mm

3.4.2 Crossmember

The crossmembers are composed of a number of small pressed channel section and some large one located beneath each board joint of the plywood, which are placed at certain center distance. There are 3 pcs of t4.0 stiffeners in each joint member.

Shape : "C" section
Small one : 122 x 45 x 45 x 4.0 mm, Qty. : 25 pcs.

Large one :	122 x 75 x 45 x 4.0 mm,	Qty. : 3 pcs.
Stiffener :	4.0 mm thick,	Qty. : 9 pcs.

3.4.3 Gooseneck Tunnel

The gooseneck tunnel consists of one piece pressed hat section tunnel plate, a number of pressed channel section tunnel bows, one box (or welded box) section rear bolster and tunnel outriggers. The gooseneck tunnel is designed according to ISO standard :

- a) Tunnel plate : 4.0 mm thick, Qty. : one piece.
- b) Tunnel bow : 4.5 mm thick, Qty. : 12 pcs.
- c) Bolster : 150 x 100 x 4.0 mm, Qty. : one piece.
- d) Outriggers : 4.0 mm thick, Qty. : 8 pcs / each side, total : 16 pcs.

3.4.4 Floor central rail

A 4.0 x 50 mm flat bar loosely placed on top of the crossmembers to support the floorboards at the center.

3.4.5 Floor retainer

A number of 25 x 25 x 2.3 mm thick angle steel will be placed beside the bottom side rails on the crossmembers to support the floorboards.

3.4.6 Base Gusset

Four corner gussets, t4.0 x 200 mm thick protection plates will be welded from side rail to corner fittings.

3.5 Front End

The front end will be composed of front end frame and corrugated end wall, which are welded together as a sub-assembly.

3.5.1 Front End Frame

The front end frame will be composed of two corner posts, one top end rail (sub-assembly), one bottom end rail and four corner fittings.

3.5.1.1 Front Corner Post

Each corner post is made of a 6.0 mm thick section steel pressing to ensure the suitable strength, light-weight and easy maintenance. Two lashing bar (Φ 12mm) are welded to each side of front corner post.

3.5.1.2 Top End Rail (sub-assembly)

The front top end rail is constructed with steel square tube lower part and steel plate upper part. The upper part is extended inwards of the container certain distance with full width from front part of top corner fittings.

Lower rail : 60 x 60 x 3.0 mm

Upper part : 3.0 mm thick

3.5.1.3 Bottom end rail

The bottom end rail consists of two longitudinal end protectors and a square tube on top with flat strips as the wood supports. Two bottom corner protectors are provided adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Longitudinal end protectors: 9.0 mm thick, Qty. : 2 pcs.
Square tube : 60 x 60 x 3.0 mm
Flat strips : 3.0 mm thick, Qty. : 2 pcs.
Bottom corner protectors : 9.0 mm thick, Qty. : 2 pcs.

3.5.2 Front End Wall

The front end wall is composed of steel sheet fully vertically corrugated into trapezium section, butt joint together to form one panel by means of automatic welding.

Front end wall thickness: 2.0mm
Corrugation dimension – Depth : 45.6 mm
Outerface : 110 mm
Interface : 104 mm
Slope : 18 mm
Pitch : 250 mm

3.6 The Rear Frame

The rear frame consists of one door header, one door sill, four corner fittings and two corner posts.

3.6.1 Rear Corner Post

Each corner post is constructed from an inner part of channel shaped hot-rolled section steel and an outer part of steel pressing, welded together to form a hollow section to ensure the door opening and 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. Two lashing bar (Φ 12mm) are welded to each side of rear corner post.

Inner part : 113 x 40 x 12 mm
Outer part : 4.5 mm thick

3.6.2 Door Header

The door header is constructed from a lower part of a "U" shaped steel pressing with internal stiffener ribs at the location of the cam keeper's backside 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 : 3.0 mm thick
Rib : 4.0 mm thick, Qty. : 4 pcs.

3.6.3 Door Sill

The door sill is built of a special channel section steel pressing with internal ribs as stiffeners at the backside 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 adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

Door sill : 4.5 mm thick, Slope : 10 mm
Stiffener ribs : 4.0 mm thick, Qty. : 4 pcs.
Channel section : 200 x 75 x 9.0 mm

3.7 Side Wall Assembly

The side walls will be continuously welded to each other and to the side rails and corner posts. Welding penetration side panels to rails should be min.75%.

3.7.1 Top Side Rails

Each top side rail is used a square steel pipe. Rail : 60 x 60 x 3.0 mm
Eight lashing ring (Φ 12mm) are welded to each side of top side rail.

3.7.2 Side Walls

Each side wall will be composed of a number of sheets of the same thickness, fully vertically corrugated into trapezium section, butt welded together to form one panel by automatic welding.

Trapezium – Depth : 36 mm
Outerface : 72 mm
Interface : 70 mm
Slope : 68 mm
Pitch : 278 mm
Side panel : 1.6 mm thick, Qty. : 11 pcs / each side.

3.8 Roof

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

Corrugation shape – Depth : 20 mm
Outerface : 91 mm
Interface : 91 mm
Slope : 13.5 mm
Pitch : 209 mm
Camber upwards : 5 mm
Panel thickness : 2.0 mm
Sheet Qty. : 11 pcs

3.8.1 Roof Reinforcement Plate

Four reinforcement plates shall be mounted around the four corner fittings.

dimension : 300 x 270 x 3.0 mm

3.9 Door

The door consists of two door leaves, each leaf with two locking devices, four hinges, seal gaskets and door holders.

3.9.1 Door Leaf

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

3.9.1.1 Door panel : With 5 corrugations.

Panel thickness : 1.6mm
Depth : 36mm
Interface : 70 mm
Slope : 68 mm

3.9.1.2 Door frame : a) Vertical door member : 100 x 50 x 3.2 mm (inner & outer) b) Horizontal door member : Channel section, 150 x 50 x 3.0 mm.

3.9.1.3 Each door is capable of swinging 270 degrees when fully opened and can be secured in that position by means of nylon ropes attached.

3.9.1.4 The right door is so designed that the right door must be opened before the left in compliance with T.I.R. requirements.

3.9.2 Door gasket

The door gasket is of extruded EPDM with a double lip to ensure water tightness. The upper and side gaskets are of 'J' type configuration. Bottom is of a 'C' type configuration. It is attached with sealant and secured with stainless steel retainers by stainless steel blind rivets.

3.9.3 Hinges and Pins

Each door is suspended by four hinges with stainless steel pins, nylon bushings and brass washers placed at the hinge pin lugs of the rear corner posts.

3.9.4 Locking Devices

Galvanized locking devices on a galvanized 34 MM dia. pipe are secured to the door with nuts and bolts and has nylon bushings on the brackets. The Locking devices will be installed after the container is painted.

3.9.5 Door Holder and Receptacle

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

3.10 Floor

3.10.1 The Floor Boards

The floor consists of plywood. The plywood used will be certified to meet the requirements of Australian Commonwealth Dept. of Health (Plant Quarantine Treatment Schedule) for Timber Components (T.C.T.). The floor dimension should according to the IICL dimension standard. The plywood thickness is 28 mm.

3.10.2 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 and 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 2.0 mm to 2.5 mm.

Screws : M8 x 45 x ø16(Head) mm
Screws' Qty. : 5 pcs / end row and joint, 3 pcs / outrigger, 4 pcs / other.

3.10.2 The plywood used will be a minimum of 19 plies and will be:

- A. Hardwood of a specific gravity range of 0.7-0.85 at a moisture content of 12%.
E.G. Keruing, Apitong.
- B. Moisture content will be 13-15% when fitted to the container.

3.11 Sealing

1. Each perimeter of the floor;
2. All the overlapped joints of inside;
3. All the holes for bolts and nuts;
4. Three sides of CSC plate and ventilators;
5. Between door gasket and door panel at 305 mm above lower gasket;
6. Details refer to the application of sealant drawing OWLF-1001.

Note: The application of interior sealant will be put on after water testing.

Sealant Materials : a. Chloroprene (Cargo contact area)
b. Butyl (Hidden parts)

3.12 Special Features

3.12.1 Shoring Slots: 61.5x40 MM slots are provided for on each of the rear corner posts so that a 2" thick batten can be secured to give protection against shifting cargo.

3.12.2 No lashing rings and lashing bars inside of container.

3.12.3 Ventilators – **Two (2)** ventilators should be small type fabricated from A.B.S. resin by injection molding process. They will be secured to the panel recess of both side walls, by means of three (3) Aluminum Huck bolts.

3.12.4 Customs Seal Provision

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

4. SURFACE PROTECTION

4.1 Surface Preparation

All steel components, prior to forming, will be shot-blasted to a SA 2.5 standard surface by means of an automatic centrifugal shot surface cleaning machine. A weld-able primer compatible to the paint system will be applied immediately to a thickness of 10 micron to preserve the surface integrity during the assembly process. After the container is assembled it is shot-blasted again manually to clean all the welds and any other area that was contaminated during the assembly process. Slags and spatters are removed by means of grinding or needle hammers.

4.2 Paint

Exterior: (Color Code:)

Apply one coat of zinc rich primer to **25 mic.** DFT.

Apply one coat of epoxy primer to **35 mic.** DFT.

Apply one coat of **Acrylic** top coat to **40 mic.** DFT.

Total **100 mic.** DFT.

Interior: (Color Code:)

Apply one coat of zinc rich primer to **20 mic.** DFT.

Apply one coat of epoxy top coat to **40 mic.** DFT.

Total **60 mic.** DFT.

4.3 Undercoating

The whole underside will be coated with **25 mic.** of zinc rich primer and **180 mic.** of Waxy or Bituminous undercoating.

Total **205 mic.** DFT.

5. MARKING

5.1 Lettering

The container will be marked in accordance with ISO requirements, owner's specifications, and other regulatory authorities.

5.2 Materials

The decals are of a self adhesive type and are warranted for seven (7) years against normal wear and tear. All data plates will be stainless steel and secured by stainless steel blind rivets and sealed with sealant.

5.3 Plating and Stamping

5.3.1 Owner's and manufacturer's serial number will be stamped into the inside right rear corner post at eye level.

5.3.2 Chemically etched stainless steel plates (Consolidated data plate i.e. TIR, CSC, TCT) will be permanently riveted with stainless steel blind rivets and sealant will be applied around these plates.

6. TESTING AND INSPECTION

6.1 Materials and Parts Inspection

All materials and parts are inspected by the manufacturer's Quality Control department to ensure they are up to the specification called for in the design.

6.2 Production Line Quality Control

All containers are manufactured under effective quality control procedures to meet the specified standards. All dimensions are checked and smooth operation of the doors are ensured after each container's completion. A light and watertight test is conducted on all containers.

Quality control personnel independent of the production dept. will be inspecting on all phases of the production as well as ad hoc inspections by the classification society's surveyor and buyer's representatives to assure the quality of the container.

7. WARRANTY

7.1 Guarantee

The guarantee period will commence the day after the certification is issued by the classification society.

7.2 Paint Guarantee

The application of paint will be guaranteed against corrosion and paint failure for a period of five (5) years. The guarantee is for all faults affecting more than 10% of the painted surfaces and will assure partial or total re-painting of the containers. Normal wear/tear, or corrosion caused by acid, alkali or results of damages by abrasion, impact or accident are excluded.

Note: 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 coated with the concerned coating system.

7.3 Other Guarantee

This container will be guaranteed against any defects or omissions in constructions, workmanship and materials for a period of one (1) year. In the event of defects, FACTORY will replace, correct or install to make the container satisfactory to this specification and its intended service at FACTORY's expense. Any damages caused by mis-handling, mis-securing, mis-loading, impact and any natures of accidents are excluded.

STAR HOUSE CO., LTD.

APPENDIX A

Material list for main steel parts:

YP = YIELD POINT (KG/MM²)

E = ELONGATION %

TS = TENSILE STRENGTH (KG/MM²)

FRONT PANEL)	JIS: SPA-H OR EQUIVALENT
FRONT TOP RAIL)	YP=35 TS=49 E=22
FRONT CORNER POST)	
FRONT BOTTOM RAIL)	
REAR CORNER POST-OUTER)	
DOOR PANEL)	
DOOR HEADER)	
DOOR RAIL)	
DOOR EDGE MEMBER)	
DOOR SILL)	
SIDE PANEL)	
TOP SIDE RAIL)	
BOTTOM SIDE RAIL)	
ROOF PANEL)	
CROSS MEMBER)	
REINFORCEMENT PLATE)	
GOOSENECK TUNNEL)	
TUNNEL OUTERIGGER)	
TUNNEL BOLSTER)	
FORK LIFT POCKET)	
FLOOR SPACER)	
DOOR SEAL RETAINER)	STAINLESS
CONE DAMAGE PROTECTOR)	JIS: SS41 HOT ROLLED SHAPED STEEL YP=25 TS=41 E=21
REAR CORNER POST-INNER)	JIS: SM50YA HOT-ROLLED HI-TENSILE SHAPED STEEL YP=37 TS=50 E=15 OR SS50 HOT-ROLLED HI-TENSILE SHAPED STEEL YP=29 TS=50 E=19
LOCKING BAR)	JIS: STK41 YP=23 TS=41 E=23
CORNER FITTING)	JIS: SCW49 MOD. WELDABLE CASTING YP=28 TS=49 E=20
DOOR HINGE)	JIS: S25C FORGING STEEL YP=23 TS=44 E=20
DOOR LOCKING CAM AND KEEPER)	JIS: S20C FORGING STEEL YP=23 TS=44 E=19

APPENDIX B

TESTING ITEMS, LOADS AND CRITERIA

NOTE: Figures in brackets of "residual deformation" column show the total residual deformation after completion of the series tests 1, 2A, 2B, 2C, 3, and 6

R: Gross Weight 30,480 KG
 P: Payload 26,740 KG
 T: Tare Weight 3,740 KG
 *Measured from the plane of bottom corner fittings.
 **Elastic Deformation
 ***Dimensions within ISO tolerance

Test Load		Permissible Criteria	
		Deflection under Load	Residual Deformation
1.	Stacking		
	848 KN (86,400 KG) per post	Corner Posts	** 4MM
		Bottom Side	2MM
	Offset: 25MM laterally	Rails	4MM
	38MM longitudinally	Cross Members	*6MM
	(1.8R-T) loaded on floor		3MM
2.A	Lifting from the four top corner fittings		
	(2R), vertically	Bottom Side	4MM
	(2R-T), loaded on floor	Rails	
		Cross Members	*6MM
			3MM
2.B	Lifting from the four bottom corner fittings		
	(2R), lifting forces 30 angle	Bottom Side	4MM
	(2R-T), Loaded on floor	Rails	
		Cross Members	*6MM
			3MM
3.	Restraint		
	(2R), R per rail, compression and tension longitudinally, (R-T) loaded on floor	Bottom Side Rails	
		Vertically	4MM
		Longitudinally	2MM

4.	Strength of End Walls			
	(0.4P) uniformly	Front End Panel Door Panel		8MM 5MM
5.	Strength of Side Walls			
	(0.6P) uniformly	Side Panel Top & Bottom Side Rails		10MM 4MM
6.	Floor Strength			
	5,460 KG, axle weight 2,730 KG per wheel	Cross Members		3MM
7.	Strength of the Roof			
	300 KG, distributed over an area of 300MM x 600MM	Roof Panel		5MM
8.A	Rigidity (Transverse)			
	15,240 KG, horizontally, push and pull	End Frame (diagonal)	** 60MM	10MM
8.B	Rigidity (Longitudinal)			
	7,620 KG, horizontally, push and pull	Side Frame (at Top Fittings)	** 25MM	7MM
9.	Weatherproofness			
	By Spray Rack System:	0.5 hour min.		
	Nozzle Pressure:	1 KG / CM ²		
	Nozzle Diameter:	12.5 MM		
	Distance from Container Surface to Nozzle:	1.5 M		
	Remove Speed:	100 MM/SEC.		
10.	One Door Off Test:			
	Stacking test :	27,450kg/post		
	Racking test:	7,500kg		
	End wall test :	5,650kg		