Gas Tanks- Technical Specification

Technical Characteristics

CAPACITY
Nominal : 24 700 litre
Tolerance : 1%A2.

UNLADEN MASS
Maximum : 9 800 kg
Tolerance : 1%A3.

MAXIMUM GROSS WEIGHT
Standard : 34 000 kgA4.

PRESSURE RATING
Design pressure (MAWP) : 22 Bar
Test pressure : 36 BarA5.

DIMENSIONS
Outside diameter vessel : 2 410 mm
Outside vessel length : 6 030 mmA6.

DESIGN
Design code : ASME VIII Div 1

M D M T : -40°C
Reference : 55°C

MOUNTING
The tank container is mounted using the unique and patented Containeering multi-directional suspension system, allowing for the isolation of movement between frame and tank.A9.

MATERIALS OF CONSTRUCTION
Tank shell : SA 612
Minimum thickness 19,1 mm
Tank ends : SA 612 Hot formed
Minimum thickness 17,7 mm
Framework : Grades of low carbon steel, main structural elements BS 4360 Grade 50C or 43C or equivalent
Manhole and flanges : SA 350 LF 2
Internal piping : Stainless steel 304L 50 NB, sched 40
Sunshield : Marine Grade Aluminium
Baffle supports : SA 612 (6 mm)

MODULE DIMENSIONS
To ISO
: Length 6 058 mm (20'0")
: Width 2 438 mm (8'0")
: Height 2 591 mm (8'6")A10.

RADIOGRAPHY
Ends : 100 %
Shells : 100 %A11.

JOINT EFFICIENCY
Ends : 1.00
Shell : 1.00A12.

CORNER CASTINGS
To ISO 1161

Manlid/Safety Relief Valves

MANLID ASSEMBLY
Tank fitted with : 500 NB diameter manlidB2.

SAFETY RELIEF ASSEMBLY
Relief valve : Fort Vale 004/2.
Pressure Setting : 22 Bar
Valve size : 80 mm (3")
Rupture Discs : Continental Disc in Stainless Steel
Manometer : Yes - Graduation 0 - 30 Bar
Protection cover : Yes

Heat Treatment

The complete vessel will be stress relieved after manufacture.

Sunshield

A Marine Grade Aluminium sunshield (2 mm) with a 120 degree included angle at spacing 40 mm from vessel is provided.

Discharge Systems

BOTTOM DISCHARGE
All valves are fitted below the liquid level and grouped together on the vessel side, enclosed by a bolt on TIR closure.

Valves

GAS LINE
1. 1 x Fisher C427T-16-10 2" internal safety valve with Fisher P651 cable controls.

LIQUID LINE
1. 1 x Fisher C427T-16-25 2" internal safety valve with Fisher P651 cable controls.

ACCESSORIES

DOCUMENT BOX
A PVC Document Box is fitted on left lower rear of frame.

EARTH CONNECTION
One (1) stainless steel strap connecting tank to frame is fitted.

EARTH POINT
Tank frame fitted with a stainless steel earthing point on the lower rear.

VOLUME
The capacity of each container is determined and used for data plate marking.

CUSTOMS SEALING
Manhole, discharge valves and relief valves are provided with Customs sealing devices.

TEMPERATURE GAUGE
Provision to fit a temperature gauge : Yes

PRESSURE GAUGE
Oil filled 0 to 40 bar mounted to the tank through on orifice of 1 mm and _" ball valve or equivalent.

VOLUMETRIC GAUGE
Provision to fit Rochester gauge.

FINISHING / PAINTING OF VESSEL AND FRAME

INTERIOR FINISH
The interior of the vessel will be shotbalsted to SA 2.5 and will be delivered in a nitrogen purged condition. Dry Nitrogen (0,2 < 1 % residual oxygen, 1 bar pressure, dew point Nitrogen -20°C) will be used for purging.

EXTERIOR FINISH
All external tank welds to be left "as welded".
The external surface of the vessel will be shotblasted to SA 2.5 before the application of the primer.
Prime coat : Hempadur Zinc 1856 - 40 micron dft
Top coat : Hempatex Hi-Build 4641 - 80 micron dft

2. 1 x Fisher N310T-16 2" ball valve.
3. 1 x 1 3/4" flanged connector in S/S 304L.
4. All gaskets and sealing in Teflon (PTFE).
5. Loctite PTFE sealer to be used on threaded connections.
6. Remote control latches (10 m stainless cable) will be located in the valve compartment.
7. A Fisher fire safe fuse on the remote controls will be provided

2. 1 x Fisher N310T-16 2" ball valve.
3. 1 x 3 1/4" flanged connector in S/S 304L.
4. All gaskets and sealing in Teflon (PTFE).
5. Loctite PTFE sealer to be used on all threaded connections.
6. Remote control latch (10 m stainless cable) will be located inside the valve compartment.
7. A Fisher fire safe fuse on the remote controls will be provided.

INTERNAL PIPING
All internal piping is in stainless steel 304L 50 NB schedule 40. The internal piping will be flanged connected to the reducer in order to make it fully demountable.

FRAME FINISH

Shotblast : The entire framework shotblast to be carried out in warm dry weather, utilising air free of moisture to a shotblast condition equivalent to Grade SA 2,5.
Prime coat : Hempadur Zinc 1856 - 40 microns dft
Top coat : Hempatex Hi-Build 4641 - 80 micron

Gas Tanks- Utilization

This container is an IMO 5 type designed for the international transportation of some liquefied gases of IMDG classes 2.1, 2.2 and 2.3. These products are allowed to be transported within the limit of the regulations and according to equipment options.
All gaskets that are in contact with the liquid are in PTFE which is compatible with a wide range of products. However, it is the user's responsibility to ensure that the gaskets used are compatible with the product carried.

The approved product list is as follows:

Identi-fication No.	Hazardous Material Description Proper Shipping Name	IMDG	ADR/ RID	DOT	Hazard Class Division	Filling Ratio kg/l	Max Load* With Baffles	Max Load*s Without Baffle	Rupture Disc
UN 1005	Ammonia, anhydrous, liquified	X	X	X	2,3	0,53	23191 kg	22791 kg	Yes
UN 1010	Butadienes, inhibited	X	X	X	2,1	0,55	23685 kg	23285 kg	No
UN 1011	Butane	X	X	X	2,1	0,51	22697 kg	22297 kg	No
UN 1012	Butylene	X	X	X	2,1	0,53	23191 kg	22791 kg	No
UN 1018	Chlorodifluoromethane, R22	X	X	X	2,2	1,03	34000 kg	34000 kg	No
UN 1020	Chloropentafluoroethane, R115	X	X	X	2,2	1,06	34000 kg	34000 kg	No
UN 1027	Cyclopropane, liquified	X	X	X	2,1	0,53	23191 kg	22791 kg	No
UN 1028	Dichlorodifluoromethane, R12	X	X	X	2,2	1,15	34000 kg	34000 kg	No
UN 1030	Difluoroethane, R152a	X	X	X	2,1	0,79	29613 kg	29213 kg	No
UN 1032	Dimethylamine, anhydrous	X	X	X	2,1	0,59	24673 kg	24273 kg	No
UN 1033	Dimethyl ether	X	X	X	2,1	0,58	24426 kg	24026 kg	No
UN 1036	Ethylamine	X	X	X	2,1	0,61	25167 kg	24767 kg	No
UN 1037	Ethylchloride	X	X	X	2,1	0,80	29860 kg	29460 kg	No
UN 1055	Isobutylene	X	X	X	2,1	0,52	22944 kg	22544 kg	No
UN 1060	Methylacetylene and propadiene mixtures, stabilized	X	X	X	2,1	0,43	20721 kg	20321 kg	No
UN 1061	Methylamine, anhydrous	X	X	X	2,1	0,58	24426 kg	24026 kg	No
UN 1063	Methyl chloride, R40	X	X	X	2,1	0,81	30107 kg	29707 kg	No
UN 1064	Methyl Mercaptan	X	X	X	2,3	0,78	29366 kg	28966 kg	Yes
UN 1075	Lquified petroleum gas	X	X	X	2,1	-	-	-	No
UN 1077	Propylene	X	X	X	2,1	0,43	20721 kg	20321 kg	No
UN 1083	Trimethylamine, anhydrous	X	X	X	2,1	0,56	23932 kg	23532 kg	No
UN 1086	Vinyl chloride, inhibited	X	X	X	2,1	0,81	30107 kg	29707 kg	No
UN 1087	Vinyl methyl ether, inhibited	X	X	X	2,1	0,67	26649 kg	26249 kg	No
UN 1969	Isobutane or Isobutane mixtures	X	X	X	2,1	0,49	22203 kg	21803 kg	No
UN 1978	Propane	X	X	X	2,1	0,42	20474 kg	20074 kg	No
UN 2517	Chlorodifluoroethanes R142	X	X	X	2,1	0,99	34000 kg	34000 kg	No
UN 2602	Dichlorodifluoromethane and difluoroethane azeotropic mixture, R500	X	X	X	2,2	1,01	34000 kg	34000 kg	No
UN 3159	Tetrafluoroethane, R134a	X	X	X	2,2	1,04	34000 kg	34000 kg	No

* Max Load = Payload + Tare

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Gas Tanks- Filling

RECOMMENDATIONS

Before any filling operations:
Make sure that the tank is empty and gas-free.
Connect the earth wire to the earth points provided on the tank frame.
When filling has been completed and/or filling pipes have been removed:
Disconnect the earth wire;
Apply TIR seals to all sealing points.

Filling and Emptying with Product

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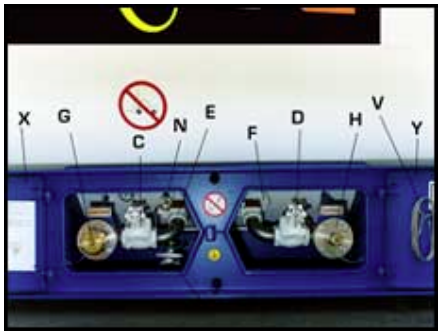
Open the vlave cabinet doors X and Y



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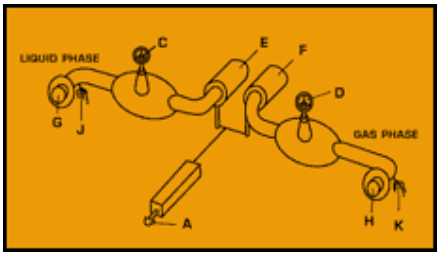

REMOTE CONTROL
The remote control cable V should be hooked onto ring N. In an emergency a sharp pull on the remote cable will automatically close off the excess flow valves E and F.

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FILLING FOR TRANSPORT UNDER INERT GAS

Follow the instructions under Filling.

A. PURGING WITH NITROGEN:

- Always fill through the liquid line and bleed off through the gas line;

- Dry Nitrogen (dew point -20°C) should be used for transport under inert gas. The main reason for this is to prevent any oxidization of the bare carbon steel on the inside of the tank;

- The most accurate procedure during purging is to use an Oxygen % metre at the gas line outlet. Purging with N_ should continue until the Oxygen content registers less than 2%. If an Oxygen % metre is not available, the following can be used as a guideline:- Duration of bleeding before closure of gas line: approximately 10-12 min;

- Care should be taken that liquid Nitrogen does not enter the gastank (indicated by freezing of the N_ feed line);

- To prevent this the Nitrogen volume flow should be controlled in order not to overstep the Nitrogen storage tank evaporator capacity. Once the oxygen has been displaced, close off the gas phase globe valve D and allow the pressure to build up to between 1 and 2 bar. Once this pressure is reached, close the excess flow valves by pushing back handle A following the instructions for closing under Filling or Emptying.

Filling or Emptying

The following filling instructions are clearly indicated on the inside of door.

A. Opening

1. Bleed off any pressure in the manifolds by opening and closing of valves 'J' & 'K'
2. Remove caps 'O' & 'H'
3. Couple 'LIQUID' & 'GAS' hose couplers
4. Pull out handle 'A' to open excess flow valves 'E' & 'F'
5. Operate 'C' & 'D' handwheels to open the globe valves slowly

B. Closing

1. Push back handle 'A' valves will close automatically
2. Operate 'C' & 'D' handwheels to close the valves
3. Disconnect 'LIQUID' & 'GAS' hose couplers
4. Screw on caps 'O' & 'H'

DANGER
N_ is lethal to human life. If a tank is N_ purged nobody should attempt to enter this tank unless it has been vented and tested before. N_ will cause collapse and death within minutes.

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Gas Tanks- Cleaning

Note

Due to the hazardous nature of the products generally transported in this container and due to the risk of compatibility with cleaning products we are not in a position to recommend any cleaning process.
The vessel material is carbon steel which, when exposed to moisture will immediately start oxidizing (corroding).
Whenever the tank is inspected for cleanliness or the manlid removed for whatever reason, it is essential that the tank be filled with product or purged with Nitrogen immediately after closure of manlid. In no case should this period be longer than 4 - 6 hours (depending on the moisture content of the air and the ambient temperature).

Should the vessel need to be shotblasted on the inside the following precaution should be taken:

I) The gas and liquid phase valves E, F, C and D should be removed from the vessel and be stored in a dust free environment. Please note that the complete gas line manifold and valves can be removed as a unit and need not be separated. The same applies to the liquid line manifold and valves.

ii) The safety relief valve should be removed from the vessel and stored in a dust free environment.

iii) The gas and liquid suction tubes on the inside of the tank is made of 304L stainless and should not be shotblasted with carbon steel particles and should thus be protected during shotblasting.

iv) These pipes should be pickled and passivated after shotblasting and thoroughly cleaned with a pipe brush and solvent on the inside to remove all dust and particles.

IMPORTANT

A. Dust or particles could lodge on the sealing surfaced of the excess flow valves and could cause leakage, therefore the inside of the tank should be carefully vacuum cleaned and the suction tube meticulously cleaned on the inside before replacing the valves and filling the vessel.

B. Never blow off purging through the liquid phase, use the gas phase for this purpose.








Gas Tanks- Maintenance & Repair

Frame

THE TORQUE SETTINGS FOR THE VARIOUS FRAME FASTENERS ARE ILLUSTRATED BELOW:

Under normal conditions bolts are torqued using a toque wrench. In order to evaluate the correct toque setting the friction resistance of the thread to nut interface needs to be accurately known. In the automotive engine area where parts are cleaned and fairly greasy, this resistance is accurately determinable.Where tank containers have been in marine conditions the re-torquing of bolts should be carried out by the turn of nut method. This method induces an extension of the bolt by applying prescribed rotation of the nut on the bolt. To be effective the head and the nut must have a solid base to react against. The bolt and connection piece are pulled into close contact called a snug tight condition.
After suitable marks are made so that the subsequent rotation between the bolt and nut may be observed the nut is subjected to appropriate rotation, depending on the grip length. It is important that the grade of bolt is confirmed to be 10.9 where necessary.

With regard to the end frame, the four topmost bolts labelled A in the accompanying sketch are M18 grade 10.9 with a grip length of 13 mm and should be tightened from a snug tight condition to a fully tight position by, turning the nut 100° or one-third of a turn, or two flats.
With regard to the M20 grade 10.9 at position C this has a joint thickness of 24 mm and the nut should be turned from a snug tight position to a fully tight position by turning it to 180° or half of a turn. or three flats.With regard to the conical mounts these should be tightened from a snug position by pre-tensioning the rubber by 2.5 mm.
The 4 bolts holding the plate to the castellated beam are grade 8.8 and these should be torqued to a nominal 420 Nm with a rotational set of 100°, whichever is the greater.
The top bolt on the top centre mount labelled D in the accompanying sketch is an M36 and is fitted onto a rubber bush. The bolt is in shear alone and should only be tightened so that it fits snugly to the washer without unduly squashing the rubber out from underneath it.

Flanges

All the flanges listed below are manufactured in SA 350 LF2 material.

(a) Manlid and cover
(b) Safety relief valve flange
(c) Liquid phase flange
(d) Gas phase flange
(e) Pressure gauge flange
(f) Temperature gauge flange
(g) Rochester gauge flange.

Manlid

The 500 NB manlid is fastened with 20 x M20 studs and nuts.
These studs and nuts are manufactured to the following specification:

Studs : SA 320 Grade L7
Nuts : SA 194 Grade 4

Replacement of Manlid Gasket

The repair procedure is as follows :

1. First ensure that there is no pressure inside the vessel and that the vessel has been properly cleaned or decontaminated.

2. Carefully remove the TIR bars welded between 2 sets of manlid nuts (note: mark the position of these TIR bars in order to refit them correctly).

3. Loosen manhole nuts.

4. Remove manlid cover.

REPLACEMENT

8. Fit manlid cover.

9. Put Loctite thread lock on all the manlid stud threads protruding through the manlid cover. Also put silicone sealant around the bottom of the stud stems to close of the gap between the stud hole and the stud in order to prevent water penetration.

10. Fit the nuts onto the manlid studs and tighten hand tight in cross order sequence.

11. Remove the excess silicone sealant but make sure the gap between the manlid forging is sealed all round with silicone. Use a torque wrench and finally tighten the

FRAME

The frame is a welded construction of low carbon steel elements BS 4360 Grade 50C and 43C.
The frame is designed by Containeering, Paris.IMPORTANT
Although looking the same, the IMO 5 Containeering frame is no interchangeable with the IMO 1 Containeering frame.
The frame is bolted to the vessel through the patented Containeering "Multidirectional Suspension Units".

This design makes for easy separation of the vessel from the frame, whether for maintenance or repairs.

TANK

This tank is a "U" stamp built vessel designed to ASME Section VIII Division 1 code. Any repairs or welding to the tank must be performed by an approved workshop with an "R" stamp (ASME repair) authorisatio registered and approved by an internationa recognised third party inspection authority.Note: It is imperative that a repair procedure manual is requested from the manufacturer befo commencement of a repair.The vessel shell and

5. Remove all traces of silicone sealer on lid and manlid. Take care not to damage painted surfaces. Also avoid damage to the manlid sealing surface.

6. Place gasket into manlid groove. Do not use grease to keep the gasket in position. The gasket and sealing surfaces must be absolutely clean.

7. Put silicone sealer all round the outer perimeter of the manhole forging - apply generously.

manlid nuts in cross order sequence to 250 Nm.

12. Repair all paint damage to the manlid and nuts with a zinc rich primer and top coat paint system or an intermediate and top coat paint system. The vessels are painted with an Hempatex paint made by Hempel, Denmark.

13. Weld the TIR bars back in the positions marked earlier.

Gas Phase Valve Replacement

The gas phase manifold assembly consists of the following components (in sequence from vessel to hose coupling):

(a) Fisher C427T-16-10 (2") internal safety excess flow valve screwed into a bolt on flange.

(b) Stainless 304 40 NB schedule 80 threaded pipe connection.

(c) Fisher 310T-16 (2") globe valve.

(d) Threaded pipe connection in stainless 304 pipe 40 NB schedule 80.

(e) ACME 1 3/4" connector bolted to the threaded plate connection. Body in stainless steel 304L and cap in cadmium plated carbon steel.

Safety Relief Valve

This vessel is equipped with a Mecathermic 140370 (3") or Fort Vale 004/ 23995 safety relief valve in stainless steel 304L.
A rupture disc is fitted. This relief valve can accept an Elfab Hughes RK80 or Continental Disc or equivalent rupture disc without any modification. A pressure gauge is provided on the relief valve body flange.
The relief valve is set to start to discharge at pressure of 22 bar.
The relief valve is bolted to the vessel by means of 8 x M24 stainless bolts - each torqued to 185 Nm. Sealing is obtained by means of a PTFE 3 mm gasket.Should the valve be removed, it is essential during replacement that the stainless TIR bar be welded to 2 adjacent safety relief valve bolts in order to satisfy custom's requirements. A new PTFE gasket must be used every time.

Liquid Phase Valve Replacement

The liquid phase manifold assembly consists of the following components (in sequence from vessel to hose coupling):

(a) Fisher C427T-16-25 (2") safety internal excess flow valve screwed into a bolt on flange.

(b) Threaded pipe connection in 304L 40 NB schedule 80 pipe.

(c) Fisher 310T-16 (2") globe valve.

(d) Threaded pipe connection in 304L 40 NB schedule 80 pipe.

(e) ACME 3 1/4" connector bolted to the threaded pipe connection (d). Body in stainless steel 304L and cap in cadmium plated carbon steel.

Paint

Hempel paint systems are used on both vessel and frame.
The specifics of the Hempel system is clearly indicated under technical specification.
All repairs and touch-ups must be done with compatible Hempel paints.
For the best advise regarding repairs and touch-ups, contact Tankspan

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dished end materials are SA 612.

Sun Shield

No insulation is provided on this IMO 5 tank, but only a sun shield. This sun shield must under no circumstances be removed as this will result in a vessel with a lower MAWP (Maximum Allowab Working Pressure). The reason for this is the design reference temperature stipulated by the IMDG Code : ie. 55°C for a vessel with sun shield and 65°C for a vessel without sun shield. The 22 bar design of this vessel for the products as per product has been done taking this sun shield into consideration.The su shield is made of 2 mm thick aluminium sheeting Grade 5251 H6 (Marine Grade). The rivets used are made of 304L stainless steel.

GASKET

All flanged connection sealing are obtained by using 3 mm thick PTFE gaskets .
All threaded connections are sealed by using Loctite 572 PTFE sealer.

TORQUE SETTINGS

All threaded connections must be carefully tightened until the correct alignment of the respective parts are obtained. DO NOT OVER TIGHTEN THREADE CONNECTIONS. This will lead to damaged threads and improper sealing.