VESSEL PARTICULARS (FORM C)
LPG/C GAS SPIRIT .
LAST UPDATE : 11/5/16

Specifications of the vessel and the gas installation which are representations by the Owners.

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name	:**GAS SPIRIT**				
Owner	: **PETCHEM TRADING INC.**				
Flag	: **MARSHALL ISLAND**				
Build	: **HIGAKI SHIPBUILDING CO. LTD**				
Date on Service	: **29 AUG. 2001**				
Class	: **LR (100A1 Liquified Gas Carrier, LPG in independent type C tanks, Ship type 2PG, Max. pressure 17.7 bar, Min. Temp ' 0' LMC)**				
GRT International	: **3678**	Suez	:	**4101.75 T**	
		Panama	:	**3678**	
NRT International	: **1104**	Suez	:	**3309.25**	
		Panama	:	**3148**	
Is vessel build according to		USCG regulations?	:	**YES**	
		RINA regulations?	:	**NA**	
		Japanese regulation?	:	**NA**	
Has vessel received		USCG approval?	:	**YES**	
		RINA approval?	:	**NA**	

HULL

LOA	:	**99.59**	**M**
LBP	:	**93.68**	**M**
Breadth	:	**17.5**	**M**
Depth	:	**7.5**	**M**
Summer Draft	:	**5.50**	**M corresponding to Summer DWT = 3408.63**
Multiple Draft		**NA**	**M corresponding to Multiple DWT = NA**

Estimated draft with full cargo and full bunkers are as follows.

Product	Draft Fore' (m)	Draft Aft' (m)	Draft Mean (m)	Corresponding Deadweight (t)
Propane (98%)	4.40	5.59	5.00	2769.88
Butadiene (98%)	5.20	5.55	5.37	3267.11
VCM (98%)	5.15	5.83	5.49	3395.65

Propeller immersion :

At draft	**At 5.00**	**m correspond.**	**75**	**:**	**%**
At draft	**At 5.25**	**m correspond.**	**85**	**:**	**%**
At draft	**At 5.50**	**m correspond.**	**90**	**:**	**%**

COMMUNICATION EQUIPMENT

Call letter		:	**V7JU4**
Radio Station normally watched		:	**YES**
Radio MF/HF NBDP		:	**YES , JRC CDJ – 1085/1980/JSS-800**
Radio MF/HFTEL/DSC		:	**YES , AS ABOVE**
VHF		:	**YES , JRC JHS -7**
Satellite Communication			
	Inmarsat 'B'	:	Tel : 870 773257561
		:	Fax: 870 783231240
	E mail	:	gasspirit@stealth.gr

MACHINERY

Main Engine x 1	. Type and make	:	**2 – CYCLE DIESEL ENGINE 6UEC37LA, AKASAKA**
	. Service power	:	**MCR :3120 KW x 210 / min , CSR : 2808 KW**
	No of Cylinders		**6 Nos.**
	Cyl Bore x Stroke		**370 mm X 880 mm**
	. Grade of fuel used	:	**IFO 380 CST**
Auxiliaries	Type and make		**4 CYCLE DIESEL ENGINE /6NY16L-UN/ YANMAR**
	(Electrical)		**440 V X 400 KVA**
	(Mechanical)		**355 KW at 1200 RPM**
	Grade of fuel used		**MDO**
	No off		**02 SETS**
Emergency Gen	Type		**MODEL : NFD 150 K**
	No off		**01 SET**
Bow Thruster	Type : Power:		**MODEL: KT 43131 , POWER : 315 KW**
Boiler	Type		**VERTICAL WATER TUBE COMPOSITE TYPE / 6K-1428**
	Evaporation		**500/400 KG/h (OIL SIDE / EXH.GAS SIDE @ 90% CSR**
	Max Design Pressure		**0.8 MPA (MAX)**
	Feed Water Temp		**60 – 70 C**
	No off		**01 SET**
Exhaust Economiser	Type		**NA**
	Evaporation		**NA**
	No off		**NA**
Air Compressors (Main)	Type / Capacity		**VERTICAL TWO STAGE WATER COOLED/ PRESSURE 2.45 MPA**
	No off		**02 SETS**
Air Compressors (Emergency)	Type		**KSC3N – V**
	No off		**01 SET**
Fuel Oil Purifier	Type		**MITSUBISHI SELFJECTOR TYPE, MODEL : SJ15F**

	No off	**02**
	Capacity	**4500 L/H**
Lub Oil Purifier	Type	**MITSUBISHI SELFJECTOR TYPE, MODEL : SJ15F**
	No off	**01**
	Capacity	**4500 L/H**
Evaporator	Type	**WM-10 M**
	Capacity	**10 T/D**
Fresh Water Sterilizer	Type	**USC – 500**
	Capacity	**500 L/H**
Fresh Water Mineraliser	Type / Capacity	**NA**
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	**BGW – 20N**
	Capacity	**25 L/h , WASTE OIL**
Oily Water Separator	Type	**USC – 20**
	Capacity	**2.0 m3 / h**
Sewage Treatment plant	Type	**SBT – 25**
	Capacity	**25 PERSON / DAY**
Hot Water Set (Calorifier unit)	No off	**01 SET**
Steering Gear	Type	**MODEL : RV 21 – 013**
	Duty Capacity	**WORKING PRESSURE : 22 MPA**
	Hydraulic pump unit	**02 SETS**

Speed

Up to and Beaufort Scale 4 Douglas Sea state 3

About 13.0 KTS Laden/Ballast

CONSUMPTION/ DAY

At Sea

Main Engine	HFO	**About 11.5 MT/Day**	**Laden/Ballast**
Auxiliary Engine	MGO	**About 1.2 MT/Day**	
In Port	MGO	**About 0.8 MT/Day**	**Idle**
	MGO	**About 3.0 MT/Day**	**Discharging**
	MGO	**About 0.8 MT/Day Additional**	**Using N2 Generator**

Permanent bunker capacity (100%)

HFO	:	**534.68 M3**
Diesel	:	**124.34 M3**
Fresh Water	:	**118 MT**

(B) CARGO INSTALLATIONS

1. Transportable products and respective quantities, calculated in accordance with IMO – maximum filling formula. (Tonnes)

	100% (CBM)	98% (CBM)		
NO.1 CARGO TANK	2050	2009		
NO.2 CARGO TANK	2050	2009		
TOTAL	4100	4018		
	SPSV (bar g)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	17.65	45.0	0.459	1844.2
Propylene	17.65	45.0	0.470	1888.4
B/P Mixture	17.65	45.0	0.487	1956.7
I-Butane	17.65	45.0	0.526	2113.4
N-Butane	17.65	45.0	0.548	2201.8
Butylene	17.65	45.0	0.565	2270.1
Butadiene	17.65	45.0	0.588	2362.5
V.C.M.	17.65	45.0	0.872	3150.6
Isoprene	17.65	45.0	0.656	2635.8
Pentane	17.65	45.0	0.600	
Pentene	17.65	45.0	0.611	

Note(1): In case of USCG, propylene, propane and B/P mixtures are not to be carried except the vapour pressure of B/P mixtures is not more than 12.75 bar g, 13.0 kg/cm^2 @ 45 °C

Note(2): On and after, the pressure value in parentheses is shown as a conversion value

Mixing ratio of above mentioned B/P mixtures is as follows:

Butane 35 wt% and propane 65 wt%

2. Other transportable products N/A

	SPSV	Ref. Temp. (°C.)	Density at Ref. Temp.	Corresponding Quantity (MT)
Raffinate 1				
Raffinate 2				
C4				

3. TANKS

3.1	Design pressure (Vapour) – BV-IGC	:	**17.70 bar g (1.77 MPag)**
	- USCG	:	**12.70 bar g (1.27 MPag)**
3.2	Valve setting	:	**17.70 bar g (1.77 MPag) / 12.70 bar g (1.27 MPag) , 6.30 bar g (0.62 Mpag)**
3.3	Maximum vacuum obtainable	:	**Atmospheric**
3.5	Maximum temperature acceptable	:	**45 ℃**
3.6	Minimum temperature acceptable	:	**0 ℃**

3.7 Hydrostatic Test Pressure : **27.0 bar g (2.66 MPag)**

4. LOADING RATE (TONS/HOUR) – For Full Cargo Parcels

Ex-atmospheric storage with gas : 1 tank : **450 m3 / h**

Return 2 tanks : **790 m3/ h**

Remarks:

***** Based on maximum velocity of 6.5 metres/sec except VCM, and 4.0 meters/sec for VCM in the liquid piping.

* If cargo temperature is less than 0 ℃, shore heater to be used. If ship heater used, max rate is **250 m^3** per hour.

***** Loading by shore pump only, proper size gas return line to be connected

***** Subject to both ship and shore tanks being under favourable conditions

5. CARGO PUMPS

5.1	Type	:	**DEEPWELL VERTICAL CENTRIFUGAL MULTI STAGE DESIGN**
	Make	:	**TEIKOKU MACHINERY WORKS, LTD**
	How many	:	**2**
	Maximum specific gravity	:	**0.948**
5.2	Capacity (CMB/Hour)	:	**300 m/h X 110 m (0.647)**
			250 m/h X 120 m (0.948)
	Two speed or variable speed	:	**Single speed**
	Rated kW (each)		**120 kw**
	Working pressure maximum	:	***17.7 Bar g***
5.3	Location	:	**CARGO TANK TOP**
	Removable	:	**YES**
5.4	Booster pumps	:	**NA**
	Type	:	NA
	Maker	:	NA
5.5	Capacity (CMB/Hour)	:	NA
	Working pressure	:	NA
5.6	Location	:	**NA**
5.7	Time to discharge a full liquid cargo using all pumps against back pressure at pump		
	1 bar	:	**about 07 hours for LPG**
	5 bars	:	**about 14 hours for LPG**
	10 bars	:	**-------**
5.8	Nominal back pressure when working	:	**about 5 bar**
	In series corresponding head	:	**N/A**
	Maximum back pressure	:	**about 10 bar**
	Nominal pressure at rail (propane)	:	**about 13 bar at 20 degree C of cargo temperature**
5.9	What amount of cargo remains in tanks after completion pumping before stripping:		
	- liquid	:	**No liquid remains in the tank**
	- vapour	:	**about 20 ton per one tank for LPG**

6. STRIPPING

6.1	Stripping system, if any	:	**Nil**

6.2 Time required to remove all traces of liquid cargo as stated in 5.9 for:
- LPG : **NA**

7. CARGO COMPRESSORS

7.1	Type	:	**VERTICAL 01 STAGE WATER COOLED DOUBLE ACTING**
	Make	:	**TANABE PNEUMATIC MACHINERY CO. LTD**
	How many	:	**2**
	Piston displacement		**460 m3/h**
	Rated Kw		**75 KW**
	Stroke		**177.8 mm**
	Max discharge pressure		**20 Bar**
	Pressure differential		**Normal 4.0 Bar / Maximum 7.0 Bar at single action**
	No of Revolutions		**540 rpm**
7.2	Are compressors oil free	:	**YES**
7.3	Can they reliquify VCM without risk	:	**NO**
7.4	State time to bring full cargo of butane to atmospheric pressure from	:	

8. ~~INERT GAS SYSTEM~~ / NITROGEN PLANT

8.1	Does the vessel use inert gas?	:	**~~NO~~ / N2 GENERATOR PLANT**
	If so, state utilization and quantities	:	**Model**: HPMB 6511 (MG GENERON)
8.2	Can the vessel produce inert gas?	:	**~~NO~~ / N2**
	If so, state type and composition of gas produce:	:	
	Discharge Capacity		185Nm3/hr
8.3	Maximum production obtainable	:	185Nm3/hr

NOTE:- Above quantities obtained at engine room temperature 45° C

8.4 State if there are storage facilities for inert gas onboard: **N/A**
- Size : **N/A**
- Pressure : **N/A**

8.5 State if any shore supply of nitrogen may be required: : **NO**
- for what purpose : **N/A**
- what quantities : **N/A**

9. GAS FREEING

9.1 State method used giving all details : **Nitrogen Plant / Fans**

9.2 State time required including stripping : **APPROX. 09 DAYS**

10. CHANGING GRADE

10.1 From completion discharge of cargo Propane, time required in hours and inert gas in CBM required to reach a tank and gas installation atmosphere of less than 100 ppm of Propane in Vapour phase.
Time required: ABOUT 66 HRS / N2 12300 m3 per tank.

10.2 Can this operation be carried out at sea? : **YES**

10.3 Can the ship measure the number of ppm in vapour phase? : **NO**

10.4 Has vessel deck tank for changing grade/cooling operations? : **NO**

10.5 Deck tanks : **NIL**
Capacity : NA
Purpose : NA

11. COOLING BEFORE LOADING : ***NA***

12. CARGO HEATER

12.1	Type	:	**SHELL & TUBE**
12.2	Inside Diameter		**650 mm**
12.3	Overall length		**6000 mm**
12.4	Cargo flow rate		**200 m3/ h (Propane)**
12.5	Min Inlet Temp		**-48 deg C**
12.6	Min Outlet Temp		**0 deg C**
12.7	Required Sea water Capacity		**420 m3/ h with 16 deg C**
12.8	Design Pressure		**20.0 Bar**
12.9	Hydrostatic Test Pressure		**30.0 Bar**
12.10	Tightness Test Pressure		**20.0 Bar**

12.0 State discharging rate for propane to be brought from atmospheric pressure: **300 m3/h basis pump**
Loading rate for Propane **– 48 ° C / 0° C**: **about 200 m3/hr** : **(as per manual)**

13. CARGO VAPORIZER

In case vapour gas is needed to feed compressors, can vessel produce its own if no shore available:
No

14. REFRIGERATING APPARATUS **NA**

14.1 Is it independent of cargo? : **NA**
Is so, state cooling agents : **NA**

14.2 What minimum temperature can be maintained : **NA**

14.3 What time required at sea to lower by $1^{o}C$ the full cargo of : **NA**

15. MEASURING APPARATUS

What gauges on board? **Float type level gauge with HHL & HL alarm switch**
Type : **SP- 3511 S , intrinsically safe type**
Location : **At each cargo tank dome**

16. SAMPLES

16.1 State how tank atmosphere samples can be taken and where from?
From slip tubes at tank dome.

	Standard of fitting?	:	**NO**
16.2	Same question for cargo	:	**BY SAMPLING LINE , WITH STANDARD FITTING**
16.3	Are sample bottles available on board?	:	**NO**

17. CARGO LINES

17.1 Is ship fitted with a port and starboard cargo manifold? : **Yes**

17.2 Position of cargo manifold

- distance from stern (AP)	(S / P)	:	**52.6**	**M**
- distance form stem (FP)	(S / P)	:	**47.0**	**M**
- height above deck		:	**1.30**	**m for Liquid manifold**
- distance from ship's rail		:	**2.45**	**M**
- underside keel to manifold		:	**8.80**	**M**

17.3 Liquid line

- flange-size	:	**8 inch.**
- type	:	300 ANSI 300 lb

Gas line

- flange-size	:	**5 inch.**
- type	:	150 ANSI 300 lb

17.4 What reducers on board? :

17.5 Is ship fitted with stern discharge? **No**

- Liquid line - diameter : **N/A**

- flange – size : **N/A**
- type : **N/A**

18. HOSES

Are serviceable hoses available on board? : **None**

18.1 :

	Length	:	**NA**
	Diameter	:	**NA**
	Flange-size	:	**NA**
	Type	:	**NA**
	Bending radius	:	**NA**
18.2	Minimum temperature acceptable	:	**NA**
	Maximum pressure acceptable	:	**NA**

18.3 For what products are hoses suitable? : **NA**

19. DERRICKS

- Hose cranes : **01**
- Where situated : **CENTRE BETWEEN 1 & 2 CARGO TKS.**
- Lifting capacity : **3.5 MT**
- Working radius : **3.6 – 13.6 m**

20. SPECIAL FACILITIES

20.1 How many grades can be segregated? : **NO SEGREGATION POSSIBLE**

20.2 How many cooled? : **N/A**

20.3 Can vessel sail with slack cargo tanks? : **Yes**