VESSEL PARTICULARS (FORM C)
LPG/C 7500 M^3

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

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name	:	**LPG/VCM :**
Owner	:	
Flag	:	**MARSHALL ISLANDS/BAHAMAS**
Build	:	**Kanrei Shipbuilding Co. Ltd., Japan**
Date on Service	:	
Class	:	**BV**

GRT International	:	**5,860 ton**	Suez	:	**-**
			Panama	:	**-**
NRT International	:	**-**	Suez	:	**-**
			Panama	:	**-**
Is vessel build according to			USCG regulations?	:	**Yes**
			RINA regulations?	:	**N/A**
			Japanese regulation?	:	**JIS**
Has vessel received			USCG approval?	:	**YES (for foreign vessel in US water)**
			RINA approval?	:	**N/A**

HULL

LOA	:	**119.5**	**M**	
LBP	:	**112.0**	**M**	
Breadth	:	**19.00**	**M**	
Depth	:	**9.00**	**M**	
Summer Draft	:	**6.80**	**M**	**corresponding to Summer DWT = 6,900 t**

COMMUNICATION EQUIPMENT

Call letter		:	**-**
Radio Station normally watched		:	**GMDSS**
Radio MF/HF NBDP		:	
Radio MF/HFTEL/DSC		:	
VHF		:	
Satellite Communication	**Inmarsat 'C'**	:	
	Inmarsat 'F'	:	**(Voice)**
		:	**(Fax)**
		:	**(E-mail)**

MACHINERY

Main Engine x 1	. Type and make	:	**MAKITA CORPORATION B&W 6L35MC (Mk 6)**
	. Service power	:	**3,510 Kw (4,772 ps) x 203 rpm (90%MCR)**
	No of Cylinders		**6**
	Cyl Bore x Stroke		**350 mm x 1050 mm**
	. Grade of fuel used	:	**HFO having a viscosity of not more than 380cst @ 50℃**
Auxiliaries	Type and make (Electrical)		**Yanmar (6N165L-SN) - A.C. drip proof, self-vent lated 450 Kw x 445V x 3 phase x 60 Hz**
	(Mechanical)		**4 stroke x 485 Kw x 1,200 rpm**
	Grade of fuel used		**Diesel Oil - 1.5~6 Cst at 40℃**
	No off		**2**
Emergency Gen	Type		**Deutz (F5L912) - 40Kw, AC 445V, 3 phase, 60 Hz**
	No off		**1**
Boiler	Type		**Miura (VWH-800E) Vertical, forced draft, oil burning type, Automatic**
	Evaporation		**717 Kg/Hr**
	Max Design Pressure		**0.7 Mpa Saturated**
	Feed Water Temp		**60℃**
	No off		**1**
Exhaust Economiser	Type		**Miura (KF-87-1F)**
	Evaporation		**470Kg/Hr actual @ continous service output of main engine**
	No off		**1**
Air Compressors (Main)	Type / Capacity		**Matsubara (MH-111) - Vertical, EMD driven, 2-stage, air cooled type / 80.0 m^3 / Hr**
	No off		**2**
Air Compressors (Emergency)	Type		**Sanwa (GS2AR) - Horizontal, ENG driven, 2-stage, air cooled type 6.0 m^3 / Hr**
	No off		**1**
Fuel Oil Purifier	Type		**Mitsubishi SJ20G - Centrifugal**
	No off		**2**
	Capacity		**950 Ltrs / Hr at 98℃**
Lub Oil Purifier	Type		**Mitsubishi SJ10G - Centrifugal**
	No off		**1**
	Capacity		**920 Ltrs / Hr at 90℃**
Evaporator	Type		**Miura Protec Co., Ltd (WM-10DK) – Waste heat recovery**
	Capacity		**1 x 10 t/day**

Fresh Water Sterilizer	Type	**Uzushio Electric Co., Ltd (USS-2K) – Electric Ultra Violet lamp with filter**
	Capacity	**1 x2,000 litre/h**
Fresh Water Mineraliser	Type / Capacity	**1 x 1000 litre/h / Nippon Controls Co Ltd (RF-1000S1) – Vertical. Welded stainless steel**
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	**Miura Protec Co Ltd (BGW-20N - Horizontal air atomizing type with aux burner**
	Capacity	**Oil @ 24.3 lit/h & Solids @ 20 Kg/h**
Oily Water Separator	Type	**Taiko Kikai Industries Co, Ltd (USM-10) – automatic oil discharge type**
	Capacity	**1 x 1.0 m3/h**
Sewage Treatment plant MEPC 159 (55)	Type	**Taiko Kikai Industries Co, Ltd (SBT-25) Activated sludge aeration (Biological) – USCG certified**
	Capacity	**1 x 25 persons per day**
Hot Water Set (Calorifier unit)	No off	**Harison Co Ltd (CFT-400-E) stainless steel 400L tank with 2 x 10Kw heaters (1 Stby) / 1 set**
Steering Gear	Type	**Electro-Hydraulic system with 2-pump units (dual system) – (one pump to be able to supply full power)**
	Duty Capacity	**26.3 t-m**
	Hydraulic pump unit	**Electric motor driven, 2 x 7.5 Kw**

Speed
Fully Loaded at design draft In Moderate weather:
About: 13.5 Knots @ CSR with 15% sea margin

CONSUMPTION/ DAY

Main Engine	HFO	**177g/kw-hr (with +3%) at NOR**	**14.910 ton/day**
Auxiliary Engine	DO	**203 g/kw-hr (with +3%) at max**	**2.360 ton/day**

Permanent bunker capacity (100%)

HFO	:	**610 m^3**
Diesel	:	**100 m^3**
Fresh Water	:	**140 m^3**

(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	3750	3675
NO.2 CARGO TANK	3750	3675
T O T A L	7500	7350

	SPSV (bar g)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	17.65	45.0	0.459	3373
Propylene	17.65	45.0	0.470	3454
B/P Mixture	17.65	45.0	0.487	3579
I-Butane	17.65	45.0	0.526	3866
N-Butane	17.65	45.0	0548	4027
Butylene	17.65	45.0	0.565	4152
Butadiene	17.65	45.0	0.588	4321
V.C.M.	17.65	45.0	0.872	6409
Isoprene	17.65	45.0	0.656	4821
Pentane	17.65	45.0	0.600	4410
Pentene	17.65	45.0	0.611	4490
B/P Mixtures	12.75	45.0	0.478	3579
N-Butane	12.75	45.0	0.548	4027
I-Butane	12.75	45.0	0.526	3866
Butadiene	12.75	45.0	0.588	4321
Butylene	12.75	45.0	0.565	4152
V.C.M.	12.75	45.0	0.872	6409
Isoprene	12.75	45.0	0.656	4821
Pentane	12.75	45.0	0.600	4410
Pentene	12.75	45.0	0.611	4490

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	**TBA**	**TBA**	**TBA**	**TBA**
Raffinate 2	**TBA**	**TBA**	**TBA**	**TBA**
C4	**TBA**	**TBA**	**TBA**	**TBA**

3. TANKS [IGC Type C independent Tank]

3.1 Design pressure (Vapour) – BV-IGC : **17.65 bar g (18.0 kg/cm^2)**
- USCG : **12.75 bar g (13.0 kg/cm^2)**

3.2 Valve setting : **17.65 bar g (18.0 kg/cm^2) / 12.75 bar g (13.0 kg/cm^2)**

3.3 Maximum vacuum obtainable : **Atmospheric**

3.5	Maximum temperature acceptable	:	**45 ℃**
3.6	Minimum temperature acceptable	:	**0 ℃**
3.7	Hydrostatic Test Pressure	:	**26.48 bar g (27.0 kg/cm^2)**

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

Ex-atmospheric storage with gas return	: 1 tank	:	**about 410 m^3 per hour for LPG** **about 250 m^3 per hour for VCM**
	2 tanks	:	**about 730 m^3 per hour for LPG** **about 450 m^3 per hour for VCM**

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 type of vertical centrifugal multistage design**
	Make	:	**SVANEHOJ**
	How many	:	**1 set per tank (2 sets)**
	Maximum specific gravity	:	**0. 601(LPG) / 0.948 (VCM)**
5.2	Capacity (CMB/Hour)	:	**400 m^3/hr at 120 m (SG 0.601)** **220 m^3/hr at 160 m (SG 0.948)**
	Two speed or variable speed	:	**Single Speed**
	Rated kW (each)		**150 kW**
	Working pressure maximum	:	**20 bar g**
5.3	Location	:	**At each cargo tank**
	Removable	:	**Yes**
5.4	Booster pumps	:	**N/A**
	Type	:	**N/A**
	Maker	:	**N/A**
5.5	Capacity (CMB/Hour)	:	**N/A**
	Working pressure	:	**N/A**
5.6	Location	:	**N/A**
5.7	Time to discharge a full liquid cargo using all pumps against back pressure at pump		
	1 bar	:	**about 19 hours for LPG**
	5 bars	:	**about 53 hours for LPG**
	10 bars	:	**-------**
5.8	Nominal back pressure when working	:	**about 1 bar**
	In series corresponding head	:	**N/A**
	Maximum back pressure	:	**about 5 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 : **about 1.5 m^3 per one tank**
- vapour : **about 40 ton per one tank for LPG**

NOTE: To reduce pressure by 1 bar/tank:- 3.8 hrs.

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 : **about 2 hours**

7. CARGO COMPRESSORS

7.1

Type	:	**Vertical water cooled 1 stage double acting**
Make	:	**Tanabe pneumatic machinery Co Ltd**
How many	:	**2 sets**
Piston displacement		**460m3/h**
Rated Kw		**75 kW**
Stroke		**177.8 mm**
Max discharge pressure		**20 bar g**
Pressure differential		**4 bar**
		Max 7 bar at single action
No of Revolutions		**540 rpm**

7.2 Are compressors oil free : **Yes**

7.3 Can they reliquefy VCM without risk : **N/A**

7.4 State time to bring full cargo of butane to atmospheric pressure from : **N/A**

8. INERT GAS SYSTEM

8.1 Does the vessel use inert gas? : **Yes (N2)**

If so, state utilization and quantities : **TBA**

8.2 Can the vessel produce inert gas? : **Yes (N2)**

If so, state type and composition of gas produce:

Nitrogen: 99 % to 99.95%

Capacity (discharge) @ 99.00% N2 is 290 Nm3/h
Capacity (discharge) @ 99.90% N2 is 180 Nm3/h
Capacity (discharge) @ 99.95% N2 is 140 Nm3/h

Oxygen: 1.0 % to 0.05%

Discharge Capacity **TBA**

8.3 Maximum production obtainable : **TBA**

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: : **N/A**

- 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 : **TBA**

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: TBA

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

10.3 Can the ship measure the number of ppm in vapour phase? : **Yes**

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

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

11. COOLING BEFORE LOADING :

12. CARGO HEATER

12.1	Type	:	**Shell and Tube**
12.2	Inside Diameter		**1000 mm**
12.3	Overall length		**8300 mm**
12.4	Cargo flow rate		**550 m3/h (Propane)**
12.5	Min Inlet Temp		**-48 °C**
12.6	Min Outlet Temp		**0 °C**
12.7	Required Sea water Capacity		**800 m3/h (Min 16°C)**
12.8	Design Pressure		**20 bar g**
12.9	Hydrostatic Test Pressure		**30 bar g**
12.10	Tightness Test Pressure		**20 bar g**

12.0 State discharging rate for propane to be brought from atmospheric pressure **NA**
Loading rate for Propane – **minus 42** ° C / 0° C: **about 145** Mt/hr

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°C the full cargo of : **NA**

15. MEASURING APPARATUS

What gauges on board?

Type	:	**Float type level gauge**
Location	:	**At each cargo tank dome**

16. SAMPLES

16.1 State how tank atmosphere samples can be taken and where from?
Sample points at tank bottom, mid and top

Standard of fitting? : **JIS PT1/2 thread**

16.2 Same question for cargo : **TBA**

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)	:	**-**	**m**
- distance form stem (FP)	:	**-**	**m**
- height above deck	:	**-**	**m for Liquid manifold**
- distance from ship's rail	:	**-**	**m**
- underside keel to manifold	:	**-**	**m**

17.3 Liquid line

- flange-size	:	**8 in.**
- type	:	**ANSI300LB RF**

Gas line

- flange-size	:	**5 in.**
- type	:	**ANSI300LB RF**

17.4 What reducers on board? : **20 carbon steel pieces supplied**

For Liquid line (low temperature)

8" ANSI 300LB to **10" ANSI 300LB, 6" ANSI 300LB, 5" ANSI 300LB**
4" ANSI 300LB, 3"ANSI 300LB
8" ANSI 150LB, 6" ANSI 150LB, 4"ANSI 150LB
8" JIS20K, 6" JIS20K, 4" JIS20K

For Vapor line (normal temp.)

5" ANSI 300LB to **4" ANSI 300LB, 3" ANSI 300LB, 2" ANSI 300LB**
6" ANSI 150LB, 5" ANSI 150LB, 3" ANSI 150LB
2" ANSI 150LB
5" JIS20K, 4" JIS20K

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	Two pieces, each	:	**TBA - Owners**
	Length	:	**TBA - Owners**
	Diameter	:	**TBA - Owners**
	Flange-size	:	**TBA - Owners**
	Type	:	**TBA - Owners**
	Bending radius	:	**TBA - Owners**
18.2	Minimum temperature acceptable	:	**TBA - Owners**
	Maximum pressure acceptable	:	**TBA - Owners**
18.3	For what products are hoses suitable?	:	**TBA - Owners**

19. DERRICKS

- Hose cranes	:	**1 set**
- Where situated	:	**Mid-ship(center)**
- Lifting capacity	:	**4.0 tons @ 10m/min**
- Working radius	:	**15m**

20. SPECIAL FACILITIES

20.1	How many grades can be segregated?	:	**Single Grade**
20.2	How many cooled?	:	**N/A**
20.3	Can vessel sail with slack cargo tanks?	:	**Yes**

MAJOR UPGRADES

Compliance with EXXON/MOBIL 2006 Criteria
Mooring Winches Fwd and Aft to have 2 mooring drums each
Level Alarm to be provided for Fuel Oil Tanks
5years Anti Fouling protection
Cylinder Oil tank for Low Sulphur Fuel to be added (with capacity for about 15 days)
2 Bilge Alarm Sensors to be fitted in Engine Room
Maker of Cargo Tank Safety valves to be Anderson Greenwood
Maker of cargo pumps to be SVANEHOJ with anti-rotating mechanism