

COMMUNICATION EQUIPMENT

Call letter : 9V2658
Radio Station normally watched : GMDSS
Radio Telex/MMSI : 564 582 000
Radio Telephony : GMDSS
VHF : 4 Sets
Satellite Communication **Inmarsat 'C'** : 456458210
Inmarsat 'FBB' : Tel: 773991395
Fax: 783989865
E-mail: epicbell@asts.onsatmail.com

MACHINERY

Main Engine

- Type and make : MAN B&W 6L35MC6.1 – 2 Cycle, Single action, direct reversible, crosshead type turbo-charged diesel engine / MAKITA CORPORATION
- No of Cylinders : 6
- Cylinder Bore : 350 mm
- Stroke : 1050 mm
- Service power (90%/100%) : 3,510 Kw @ 203 rpm / 3,900Kw @210rpm
- Grade of fuel used : H.F.O Cst 380 @ 50°C

Auxiliaries x 2

- Type and make : 6NY16L-EW Yanmar Diesel, 2 sets x 441 kW – 60 Hz, 3 Ph, 500 Kva / YANMAR CO., LTD
- Grade of fuel used : Diesel Oil 9 Cst @ 50°C

Emergency Generator

- Type and Make : HCM434D1 – 250 Kva (200 kW) x 440 Vx 60Hz x3Ph
- Grade of fuel used : Diesel Oil (Self-exciting Brushless, drip proof)

Exhaust Economiser

- Type : Forced circulating multi tube type
- Model : Aalborg- OC
- Design Steam Pressure : 0.69 Mpa
- Feed Water : 60 °C
- Quantity : 1 Set
- Heat Output : 500 Kg/h @ 90% MCR

Auxiliary Boiler

- Type : MISSON OC – Composite/ Vertical water tube
- Model : SSC-4 – (Sunflame Co., Ltd)
- Design Steam Pressure : 0.69 Mpa
- Working Steam Pressure : 0.59 Mpa
- Quantity : 1 set
- Heat Output : 750 Kg/Hr

Fuel Oil Purifier

- Type : Motor driven bowl centrifugal
- No of : 1
- Model / Capacity : SJ20G / 1,750 L/Hr(@ 98°C for 380 cSt / 50°C)

Diesel Oil Purifier

- Type : Motor driven bowl centrifugal
- No of : 1
- Model / Capacity : SJ20G / 1,950 L/Hr @ 90°C for 100 cSt / 40°C.

Lub. Oil Purifier	Type No of Model / Capacity	Motor driven bowl centrifugal 1 SJ20G / 1,950 L/Hr @ 90°C for 100 cSt / 40°C
Main Air Compressor	Type No of Model / Capacity	Vertical 2- staged air cooled 2 MH120K/ 85 m³/ Hr x 2.94 Mpa
Main Air Reservoir	Type No of Model / Capacity	Vertical (Steel welded) 2 1,500 L & 2.94 Mpa (Kanazawa Iron Works Ltd)
Evaporator	Type No of Model / Capacity	Tubular type, KE-10 1 10 ton/day
Calorifier	Type No of Model / Capacity	Tank, Steam 1 TSS-400 / 400 L
Steering Gear	Type No of Model / Capacity	EI Hydraulic 2 RV21-022

Speed:

In good weather: **About: 14.8 Kn @ Fully loaded draft (6.8 M) – 15% Sea Margin**

CONSUMPTION/ DAY

Main Engine	15.0 t / day – 5% (at RPM 203 – 90% MCR) @ 14.8 Kt, loaded voyage	9.7 t /day @ ecco speed at RPM 175 – 75% MCR) under loaded condition
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Auxiliary Engine	1.0 Ton / day at Sea 0.85 ton / day at load port	About 1.4 ton / day during discharging
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Permanent bunker capacity (100%)

HFO	: About 492.64 m³
Diesel	: About 69.28 m³

(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 *6	3,606.159	3,534.035 *7		
NO.2 CARGO TANK *6	3,606.368	3,534.240 *7		
TOTAL *5	7,212.527	7,068.275		
IGC	SPSV (Mpa G)	Ref. Temp. (deg. C.)	Specific gravity at (Ref. Temp.)	Max Corresponding Quantity (MT)
Propylene *1	1.76	45	0.470	3,238
Propane *1	1.76	45	0.459	3,316
B/P Mixture *1	1.76	45	0.487 *2	3,502 *2
ISO-Butane	1.76	45	0.526	3,710
N-Butane	1.76	45	0.548	3,866
Butylene	1.76	45	0.565	3,986
Butadiene *4	1.76	45	0.588	4,148
V.C.M. *4	1.76	45	0.872	6,152 *3
Isoprene *4	1.76	45	0.656	4,628
Pentanes	1.76	45	0.600	4,232
Pentene	1.76	45	0.611	4,310
USCG				
N-Butane	1.27	45	0.548	3,866
ISO-Butane	1.27	45	0.526	3,710
Butadiene *4	1.27	45	0.588	4,148
Butylene	1.27	45	0.565	3,986
VCM *4	1.27	45	0.872	6152 *3
Isoprene *4	1.27	45	0.656	4,628
Pentanes	1.27	45	0.600	4,232
Pentene	1.27	45	0.611	4,310

*1 The carriage of Propylene, and propane / butane mixtures having a vapour pressure more than 1.27 Mpa G are not allowed in US ports due to higher STRESS FACTOR in accordance with the USCG requirements

*2 For reference mixing ratio of P/B mixture shows Butane 35% and Propane 65%

*3 Filling limit of VCM is to be determined according to the damaged stability of the vessel and max loading capacities is to be calculated by the shipyard and subject to bunker/ FW and other constant.

*4 The cargo should be sufficiently inhibited to prevent polymerization.

*5 Only one product can be carried at a time and no provisions for segregation of different products are fitted.

*6 The filling limit of cargo quantity in each cargo tank shall be less than 98% of tank volume at Ref. temperature.

*7 The maximum corresponding quantity of VCM is for calculation figure only basis on 98% filling limit. The actual loading quantity should be subject to ship's stability, load line and bunker contribution and ROB at the time of loading.

2. Other transportable products

	SPSV	Ref. Temp. (°C.)	Density at Ref. Temp.	Max Corresponding Quantity (MT)
Raffinate 1	1.76/1.27 Mpa	45	TBA	Subject to density
Raffinate 2	1.76/1.27 Mpa	45	TBA	Subject to density
Crude C4	1.76/1.27 Mpa	45	TBA	Subject to density

3. TANKS

3.1	Design pressure (Vapour)	:	17.65 Bar g
3.2	Safety valve setting	:	17.65 Bar g – IGC 12.75 Bar g - USCG
3.3	Maximum vacuum obtainable	:	0.0Kg/cm2 G
3.4	Maximum specific gravity	:	0.949 (VCM @ 0 °C)
3.5	Maximum temperature acceptable	:	+45 °C
3.6	Minimum temperature acceptable	:	-10 °C

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

Case 1: with vapour return	:	1 tank	:	730 m³ per hour (For LPG) 560 m³ per hour (For VCM)
Case 2: with vapour return	:	2 tanks	:	1130 m³ per hour (For LPG) 870 m³ per hour (For VCM)

Remarks:

- * Based on maximum velocity of **5** metres /sec for VCM & **6.5** meters/sec for LPG in the liquid piping
- * If cargo temperature is less than -10°C, shore heater to be used. If ship heater used, max rate as per **550** m³ per hour basis on cargo heater capacity.
- * Loading by shore pump only, proper size gas return line to be connected.
- * Subject to both ship and shore tanks being under favourable conditions
- * The loading rate will decrease when vapour return is not available.
- * In case an excess vibration or noise, etc for the cargo piping are observed during loading. The loading rate should be reduced.

5. CARGO PUMPS

5.1	Type	:	Deepwell Pump of vertical centrifugal with inducer – DW 200/200-3-K+I
	Make	:	WARTSILA AVANEHOJ A/S
	How many	:	Two (2)
	Maximum specific gravity	:	0.610 (LPG) / 0.965 (VCM) Kg/L
5.2	Capacity (CMB/Hour)	:	400 m³ per hour (LPG) @ 110 m.l.c 200 m³ per hour (VCM) @ 138 m.l.c
	Two speed or variable speed	:	Single speed (1785 rpm)
	Motor Power Output	:	150 Kw (AC 440V, 60Hz, 3-phase)
	Working pressure maximum	:	2.0 Mpa G
5.3	Location	:	At each cargo tank
	Removable	:	Fixed type.
5.4	Booster pumps	:	1 Set
	Type	:	Horizontal centrifugal type – NMB 150C
	Maker	:	WARTSILA SVANEHOJ A/S.
5.5	Capacity (CMB/Hour)	:	400 m³ per hour x 110 mTH
	Working temperature	:	-48 °C to + 45 °C
5.6	Location	:	Starboard rack at the top of starboard manifold
5.7	Time to discharge a full liquid cargo using all pumps against back pressure at pump 1 bar	:	N/A

- 5 bars : **N/A**
 10 bars : **N/A**
- 5.8 Nominal back pressure when working : **N/A**
 In series corresponding head : **N/A**
 Maximum back pressure : **N/A**
 Nominal pressure at rail (propane) : **N/A**
- 5.9 What amount of cargo remains in tanks after completion pumping before stripping:
 - liquid : **About 0.8 m³ each tank excluding Dew on inside tank surface**
 - vapour (Propane) : **About 1,400 Kg (at tank pressure 0.0 Kg/cm2(G) and temperature 10 deg.C)**

6. STRIPPING

- 6.1 Stripping system, if any : **N/A**
- 6.2 Time required to remove all traces of liquid cargo as stated in 5.9 for:
 - LPG : **N/A**

7. CARGO COMPRESSORS

- 7.1 Type : **Vertical single-stage water cooled double acting – (LPGOS-97A)**
 Make : **Tanabe Pneumatic Machinery Co., Ltd**
 How many : **Two**
 :
 Piston displacement : **460 M³/HR**
 Suction Pressure : **0.002 – 1.72 MPA G**
 Discharge Pressure : **Max 2.0 Mpa G**
 : **(Double action) Suction Pressure+ 0.19–0.4Mpa G**
 : **(Single action) Suction pressure + 0.70 Mpa**
 Revolutions : **450 rpm**
 Rated KW : **75KW**
- 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 (Nitrogen)**
 If so, state utilization and quantities : **N2 99.9%: 185Nm³/hr**
 : **N2 99.0%: 300Nm³/hr**
 : **N2 97.0%: 380Nm³/hr**
- 8.2 Can the vessel produce inert gas? : **Yes (Nitrogen)**

If so, state type and composition of gas produce:

Nitrogen: 97% to 99.9%

Oxygen: 3.0% to 0.1%

- 8.3 Maximum production obtainable : **3% Oxygen – 380 M³/HR**
2% Oxygen – 350 M³/HR
1% Oxygen – 300 M³/HR
0.5% Oxygen – 265 M³/HR
0.1% Oxygen – 185 M³/HR

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

Max dry air production capacity : **831 m³/hr**; Max back pressure: **0.8 Mpa**

8.4 State if there are storage facilities for inert gas onboard: **No**

- 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 / Fan**
1) Discharge remaining cargo tanks as much as possible
2) Purge remaining cargo tanks with inert gas produced by Nitrogen Generator onboard vessel.
3) Ventilate cargo tank with dry air produced by N2 system

9.2 State time required including stripping : **Approx 4.5 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.

About 3 .5 days

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? : **N/A**

10.5 Deck tanks : **N/A**

Capacity : **N/A**

Purpose : **N/A**

11. **COOLING BEFORE LOADING** : **No cooling plant is onboard vessel**

12. CARGO HEATER

12.1 State heating source : **Horizontal shell and tube type _Cargo heater**

- | | |
|-----------------------------|--|
| Max cargo flow rate | 550 M³/HR |
| Heating capacity | -45 deg. C to -10 deg. C (Propane base)
-13 deg. C to -10 deg. C (V.C.M base) |
| Required sea water capacity | 600 M³/HR |
| Design temp of sea water | 18 deg. C (min) |
- 12.2 State discharging rate for propane to be brought to -10°C. (**550 M³/HR**)
(Sea temperature inlet: + **18 °C**; **Outlet is not less than +6 °C**)
Cargo flow rate: **550 M³/HR**
Loading rate for Propane: **-45 deg. C to -10 deg. C: Maximum 550 M³/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

- 14.1 Is it independent of cargo? : **N/A**
Is so, state cooling agents : **N/A**
- 14.2 What minimum temperature can be maintained : **N/A**
- 14.3 What time required at sea to lower by 1°C the full cargo of : **N/A**

15. MEASURING APPARATUS

What gauges on board? **Musasino Co., Ltd**
Type : **(Main & Back up) Float type level gauge; M-LMV**
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? : **Yes / Size : PT ¼" with closed loop**
- 16.2 Same question for cargo : **Tank bottom and mid**
- 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 **Between no.1 and no.2 cargo tanks - amidships**
- | | | |
|------------------------------|-----------------|----------|
| - distance from stern | : 59.3 | m |
| - distance form stem | : 50.7 | m |
| - height above deck | : 1.50 | m |
| - distance from ship's rail | : 2.25 | M |
| - underside keel to manifold | : 10.495 | m |

- 17.3 **Liquid line**
- | | | | |
|-----|-------------------|---|---------------------------------|
| FWD | Manifold-Diameter | : | 10 Inch ANSI 300 LB 250A |
| | Tankside Diameter | | 8 Inch ANSI 300 LB 200A |
| | - type | : | Slip-on / welding neck |
- Gas line**
- | | | |
|---------------------|---|-------------------------------|
| - Manifold Diameter | : | 6 Inch ANSI 300 LB |
| - type | : | Slip-on / welding neck |
- 17.4 What reducers on board? : **Shore connection – 20 pieces of reducer to be furnished for shore connection of loading pipelines.**
- Low Temperature (ANSI 300LB/ ANSI 300LB) – 6 pieces (- 48 °C to + 45 °C)**
10"/12" 10"/8" 10"/6" 10"/5" 10"/4" 10"/3"
- Low Temperature (ANSI 300LB/ ANSI 150LB) – 4 pieces (- 48 °C to + 45 °C)**
10"/10" 10"/8" 10"/6" 10"/5"
- Nom Temperature (ANSI 300LB/ ANSI 300LB) – 5 pieces (-10 °C to + 45 °C)**
6"/8" 6"/5" 6"/4" 6"/3" 6"/2"
- Nom Temperature (ANSI 300Lb/ ANSI 150LB) – 5 pieces (-10 °C to + 45 °C)**
6"/8" 6"/6" 6"/5" 6"/4" 6"x3"
- | | |
|---|------------|
| 10" ANSI 300LB to 10" ANSI 150LB | Yes |
| 6" ANSI 300LB to 6" ANSI 150LB | Yes |
- 17.5 Is ship fitted with stern discharge? : **No**
- | | | |
|--------------------------|---|-----------|
| - Liquid line - diameter | : | No |
| - flange – size | : | No |
| - type | : | No |
- 18. HOSES**
- Are serviceable hoses available on board? : **No**
- 18.1 Two pieces, each : **NA**
- | | | |
|----------------|---|--|
| Length | : | |
| Diameter | : | |
| Flange-size | : | |
| Type | : | |
| Bending radius | : | |
- 18.2 Minimum temperature acceptable : **NA**
- | | | |
|-----------------------------|---|--|
| Maximum pressure acceptable | : | |
|-----------------------------|---|--|
- 18.3 For what products are hoses suitable? : **NA**
- 19. DERRICKS**
- | | | |
|------------------|---|---|
| - Hose cranes | : | 1 x Electric Hydraulic type (Hoisting/Slewing) |
| - Where situated | : | At mid ship (hoisting abt. 10 m/min) |

- Lifting capacity : **5 tons (SWL)**
- Maximum distance ship's side of lifting hook when derrick swung outboard? : **5.00 Mtrs**

20. SPECIAL FACILITIES

- 20.1 How many grades can be segregated? : **One product type of cargo can be loaded only; The grade segregation is provided by isolation valves but insufficient.**
- Indicate systems : : **N/A**
- Alternatively : : **N/A**
- 20.2 How many cooled? : **N/A**
- 20.3 Can vessel sail with slack cargo tanks? : **Yes**

21. EMERGENCY SHUTDOWN SYSTEM

1. Oil hydraulic piping with ESDV's of automatic and / or manual operation
2. One remote push button switch for the emergency stop by the terminal's responsible persons