



VESSEL PARTICULARS FORM "C"  
ECO FROST 22,000m<sup>3</sup> LPG/NH<sub>3</sub>/VCM CARRIER - DATE 01/0/2017

**COMMUNICATION EQUIPMENT**

Call letter	:	<b>V7TL7</b>
Radio Station normally watched	:	<b>Yes</b>
Radio MF/HF NBDP	:	<b>JSS-2250 include</b>
Radio MF/HFTEL/DSC	:	<b>JSS-2250 include</b>
VHF	:	<b>JHS-770S 2sets</b>
Satellite Communication	<b>Inmarsat 'C'</b>	<b>: 453834731</b>
	<b>Inmarsat 'FBB'</b>	<b>: +870773256785</b>
	<b>e-mail</b>	<b>: ecofrost@stealth.gr</b>
		<b>:</b>
<b>Main Engine x 1</b>	Type and make	<b>: MAN B&amp;W 6S50ME-C8.5</b>
	Service power	<b>: 7,155 Kw x 113.0 rpm (90% of SMCR)</b>
	No of Cylinders	<b>6</b>
	Cyl Bore x Stroke	<b>500 mm x 2,000 mm</b>
	Grade of fuel used	<b>: HFO - viscosity of up to 700cst at 50°C</b>
<b>Auxiliaries</b>	Type and make (Electrical)	<b>Yanmar 6EY22LW rated 900 Kw x 450V x 3 phases x 60 Hz</b>
	(Mechanical)	<b>4 stroke x 970 Kw x 720 rpm</b>
	Grade of fuel used	<b>HFO - viscosity of up to 700cst at 50°C</b>
	No off	<b>3</b>
<b>Emergency Gen</b>	Type	<b>STX Engine 6CT8.3DMGE – 120Kw, AC 450V, 3 phase, 60 Hz</b>
	No off	<b>1</b>
<b>Composite Boiler</b>	Type	<b>Alfa Laval OC-TCi 3,800 Kg/Hr KBM 200</b>
	Evaporation	<b>2,500 Kg/hr (Oil fired section) 1,000 Kg/hr (Exhaust gas M/E), 2X150 Kg/hr (Exhaust gas A/E), 0.7 Mpa Saturated</b>
	Max Design Pressure	<b>0.7 Mpa Saturated</b>
	Feed Water Temp	<b>80°C</b>
	No off	<b>1</b>
<b>Exhaust Economiser</b>	Type	<b>N/A</b>
	Evaporation	<b>-</b>
	No off	<b>-</b>
<b>Air Compressors (Main)</b>	Type / Capacity	<b>Sauer Compressor (WP121L) - Vertical, 2-stage, Air cooled type / 150m<sup>3</sup> / hr</b>
	No off	<b>2</b>
<b>Air Compressors (Emergency)</b>	Type	<b>Sauer Compressor (WP33L)</b>
	No off	<b>1</b>
<b>Fuel Oil Purifier</b>	Type	<b>GEA OSE20-0136-067/20 – Centrifugal</b>
	No off	<b>2</b>

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<b>Lub Oil Purifier</b>	Capacity	<b>2,500 Ltrs / Hr, 700mm<sup>2</sup>/s at 50°C</b>
	Type	<b>GEA OSE5-91-037/5 – Centrifugal</b>
	No off	<b>1</b>
	Capacity	<b>1,400 Ltrs / Hr, 30mm<sup>2</sup>/s</b>
<b>Evaporator (F.W generator)</b>	Type	<b>Alfa Laval AQUA blue-C80-HW / HWL 7-20</b>
	Capacity	<b>1 X 15 m<sup>3</sup>/24h</b>
<b>Fresh Water Sterilizer</b>	Type	<b>DAE HEUNG TECH ULTRA VIOLET RAY TYPE</b>
	Capacity	<b>1 X 5000 L/h</b>
<b>Waste Oil Incinerator (IMO MEPC 76 (40))</b>	Type	<b>HMMCO MAXI NG50 SL WS</b>
	Capacity	<b>Oil at 38 kg/h &amp; Solids at 80 Kg/h</b>
<b>Oily Water Separator</b>	Type	<b>SKF TMPB-2,5</b>
	Capacity	<b>1 X 2.5 m<sup>3</sup>/h</b>
<b>Sewage Treatment plant</b>	Type	<b>IL SEUNG Co, Ltd (ISB-04)- BIOLOGICAL MOVING BED BIFILM REACTOR</b>
	Capacity	<b>1 X 25 persons per day</b>
<b>Hot Water Set (Calorifier unit)</b>	No off	<b>DAE HEUNG TECH Co., Ltd. 300L with 1 x 1.0m<sup>2</sup> steam heater / 1 set</b>
<b>Steering Gear</b>	Type	<b>Rolls-Royce industries -Electro-hydraulic, Rotary vane type (RV850-3)</b>

**SPEED & MAIN ENGINE CONSUMPTIONS**

Always about and up to Beaufort scale 4 - sea state Douglas 3

Av. Speed	M/E IFO Consumption (MT/day)	
	In Ballast condition	In Ladden condition
13.0 knots	abt 14.5	abt 15.5
14.0 knots	abt 17.0	abt 18.5
15.0 knots	abt 20.0	abt 21.5

1. The speed and consumption figures at sea are based on design draft, and are best estimates basis daily weather conditions up to Beaufort scale 4 - sea state Douglas 3, without effect of sea currents or swell, and vessel en route under a steady course, with a net sea passage duration of at least 24 hrs.

2. Consumption figures at port are subject to port movements, port and/or harbour, terminal requirements, for the safe manoeuvring, approach, inland navigation, and port stay of the vessel throughout her call. All figures are about, defiend as +/- 5%.

**AUXILIARY ENGINES CONSUMPTION**

	IFO Consumption (MT/day)	No of units running
At Sea (Ballast)	abt 3.5 MT/Day	1

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At Sea (Laden & Cooling max Capacity)	abt 9.5 MT/Day	3
Loading (No cooling)	abt 4.5 MT/Day	1
Loading (Cooling at max capacity)	abt 9.0 MT/Day	3
Discharging (Fully Refrigerated)	abt 8.5 MT/Day	3
Discharging (Heating cargo)	abt 8.0 MT/Day	2
At anchor / Idle	abt 3.5 MT/Day	1
Inerting / Gass Freeing	abt 7.0 MT/Day	2

**BOILER CONSUMPTION**

	Consumption (MT/day)
At Sea	abt 0.5 MT/Day
At Port	abt 2.0 MT/Day

All s&c figures above are "about", defined as +/- 5%

**BUNKER CAPACITY**

HFO : **1,683.3 m<sup>3</sup> (Fuel oil bunker tanks are DH) AT 95%**

Diesel : **498.2 m<sup>3</sup> (Diesel oil bunker tanks are DH) AT 95%**

Fresh Water : **267.2 m<sup>3</sup>**

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

	100% (CBM)	98% (CBM)
<b>NO.1 CARGO TANK(P/S)</b>	<b>4,927.5</b>	<b>4,829.0</b>
<b>NO.2 CARGO TANK(P/S)</b>	<b>5,829.4</b>	<b>5,712.8</b>
<b>NO.3 CARGO TANK(P/S)</b>	<b>5,831.6</b>	<b>5,715.0</b>
<b>NO.4 CARGO TANK(P/S)</b>	<b>5,614.5</b>	<b>5,502.2</b>
<b>DECK TANK</b>	<b>155.5</b>	<b>152.4</b>
<b>TOTAL</b>	<b>22,358.5</b>	<b>21,911.4</b>

**1.1 Carrying capacity at maximum reference temperature**

	SPSV	Ref Temp.	Pressure. at Ref. Temp	Density at Ref Temp.	Corresponding Quantity @98%filling (MT) at ref temperatures (deck tank quantity at 45°C)
	MPaG	°C	MPaG	kg/m <sup>3</sup>	MT
C-Propane (2,5 mole % ethane)	<b>0.53</b>	7.1	0.53	517	11,315
C-Propane (8 mole % ethane)	<b>0.53</b>	1.6	0.53	520	11,377
Propylene	<b>0.53</b>	2.9	0.53	542	11,859
B/P Mixture (4)	<b>0.53</b>	26.5	0.53	530	11,609
I-Butane	0.53	<b>45.0</b>	0.50	524	11,483
N-Butane	0.53	<b>45.0</b>	0.33	549	12,019
Butylene	0.53	<b>45.0</b>	0.42	560	12,272
Butadiene	0.53	<b>45.0</b>	0.40	589	12,898
V.C.M.	<b>0.35</b>	29.6	0.35	888	19,443
Isoprene (3)	0.53	<b>45.0</b>	0.05	654	14,330
Pentane (3)	0.53	<b>45.0</b>	0.03	600	13,143
Pentene (3)	0.53	<b>45.0</b>	0.06	616	13,488
Anhydrous ammonia	0.53	<b>-20.0</b>	0.09	657	14,391
C4 fractions (4)	0.53	<b>45.0</b>	0.44	545	11,947
Dimethylamine (3)	0.53	<b>45.0</b>	0.28	624	13,662
Diethyl ether, (1) (3)	0.53	<b>45.0</b>	0.04	678	8,239
Methyl chloride (2)	<b>0.35</b>	16.9	0.35	922	11,193
Ethylamine / Monoethylamine (1) (3)	0.53	<b>45.0</b>	0.17	653	7,931
Acetaldehyde (3)	0.53	<b>45.0</b>	0.14	739	16,190
Isopropylamine, (1) (3)	0.53	<b>45.0</b>	0.06	661	8,030
Vinyl ethyl ether. (1) (3)	0.53	<b>45.0</b>	0.04	756	9,182
Raffinate 1 (4)	0.53	<b>45.0</b>	0.37	572	12,539
Raffinate 2 (4)	0.53	<b>45.0</b>	0.33	572	12,529

(1) In accordance with section 17.11 of the IGC Code, the quantity of this cargo should not exceed, 3,000m<sup>3</sup> in any one tank.

(2) Methyl chloride must be loaded at min -10 °C as lower temp. will result in too high density.

(3) Non-Cooled cargoes are carried at ambient conditions, therefore the max ambient air temp (+45°C) is used as reference temperature

(4) See next page.

Note: Figures in bold are limits for cargo tanks (not deck tank)

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**1.2 Carrying capacity at fully refrigerated condition (minimum carrying temperature)**

	SPSV	Ref Temp.	Press. at Ref. Temp.	Density at Ref Temp.	Corresponding Quantity @98%filling (MT) at ref temperatures (deck tank quantity at 45°C)
	MPa G	°C	MPaG	kg/m <sup>3</sup>	MT
C-Propane (2,5 mole % ethane)	0.53	-45.3	<b>0.00</b>	583.4	12,763
C-Propane (8 mole % ethane)	0.53	<b>-51.4</b>	<b>0.00</b>	586.5	12,830
Propylene	0.53	-47.4	<b>0.00</b>	608.7	13,317
B/P Mixture (4)	0.53	-30.2	<b>0.00</b>	599.2	13,115
I-Butane	0.53	-11.7	<b>0.00</b>	593.8	13,000
N-Butane	0.53	-0.4	<b>0.00</b>	601.6	13,174
Butylene	0.53	-6.7	<b>0.00</b>	623.3	13,649
Butadiene	0.53	-4.4	<b>0.00</b>	650.3	14,239
V.C.M.	0.35	-15.6	<b>0.00</b>	965.3	21,134
Isoprene (3)	0.53	32.9	<b>0.00</b>	666.7	14,606
Pentane (3)	0.53	36.2	<b>0.00</b>	609.1	13,344
Pentene (3)	0.53	29.9	<b>0.00</b>	632.3	13,852
Anhydrous ammonia	0.53	-33.0	<b>0.00</b>	673.1	14,732
C4 fractions (4)	0.53	-7.8	<b>0.00</b>	609.5	13,346
Dimethylamine (3)	0.53	7.2	<b>0.00</b>	671.6	14,708
Diethyl ether, (1) (3)	0.53	34.6	<b>0.00</b>	690.7	8,391
Methyl chloride (2)	0.35	<b>-10.0</b>	0.08	<b>970.6</b>	11,779
Ethylamine / Monoethylamine (1) (3)	0.53	16.7	<b>0.00</b>	686.8	8,341
Acetaldehyde (3)	0.53	21.0	<b>0.00</b>	771.0	16,888
Isopropylamine, (1) (3)	0.53	32.5	<b>0.00</b>	675.2	8,203
Vinyl ethyl ether. (1) (3)	0.53	35.6	<b>0.00</b>	767.8	9,329
Raffinate 1 (4)	0.53	-2.9	<b>0.00</b>	630.6	13,809
Raffinate 1 (4)	0.53	-0.2	<b>0.00</b>	626.0	13,709

(1) In accordance with section 17.11 of the IGC Code, the quantity of this cargo should not exceed, 3,000m<sup>3</sup> in any one tank.

(2) Methyl chloride must be loaded at min -10 °C as lower temp. will result in too high density.

(3) Non-Cooled cargoes are carried at ambient conditions, therefore the max ambient air temp (+45°C) is used as reference temperature

(4) Densities for mixtures:

*B/P Mixture: calculated as 50 mol% Propane, 25 mol% i-Butane, 25 mol % n-Butane*

*C4 fractions: calculated as 50 mol% i-Butane, 25 mol% n-Butane, 25 mol% Butadiene*

*Rafinate 1: calculated as 50wt % isobutylene, 25wt % cis-2-butene, 25wt % trans-2-butene*

*Rafinate 2: calculated as 30wt % cis-2-butene, 30wt % trans-2-butene, 20 wt % 1-Butene, 20wt % n-Butane.*

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**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 22 hrs (abt. 43700 Nm<sup>3</sup> of N<sub>2</sub>)**
- 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 : **1**  
Capacity : **155 m<sup>3</sup>**  
Purpose : for changing grade or carry additional cargo (deck tank is not insulated and designed to carry all cargo up to ambient temp of 45degC)

**11. COOLING BEFORE LOADING** :

**12. CARGO HEATER**

- 12.1 Type : **Shell and Tube**
- 12.2 Inside Diameter : **780 mm**
- 12.3 Overall length : **7,379 mm**
- 12.4 Cargo flow rate : **500 m<sup>3</sup>/h (Propane)**
- 12.5 Min Inlet Temp : **-55 °C (design)**
- 12.6 Min Outlet Temp : **-52 °C (design)**
- 12.7 Required Sea water Capacity : **790 m<sup>3</sup>/h**
- 12.8 Design Pressure : **25 bar g ( tube side)**
- 12.9 Hydrostatic Test Pressure : **37,5 bar g ( tube side)**
- 12.10 Tightness Test Pressure : **25 bar g**  
**Shell and Tube**
- 12.0 State discharging rate for propane to be brought from atmospheric pressure **N/A**  
Loading rate for Propane – **minus 42.8 °C / 0 °C: about 500 m<sup>3</sup>/hr ( with SW of 15 °C)**

**13. CARGO VAPORIZER**

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

**Yes, capacity 2,000 Nm<sup>3</sup>/hr**

**14. REFRIGERATING APPARATUS**

**3 Reliquefaction Units**

- 14.1 Is it independent of cargo? : **Yes**  
If so, state cooling agents : **Sea Water**
- 14.2 What minimum temperature can be maintained : **-52 deg C (for C-propane with 8% mole ethane)**
- 14.3 What time required at sea to lower by 1°C the full cargo of Propane (basis air temp +45 °C and sea temp +30 °C and three reliquifaction units in operation) : **From 0 °C to -1 °C: 2.8hrs**  
**From -10 °C to -11 °C: 4 hrs**

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**15. MEASURING APPARATUS**

What gauges on board?

Type : **Float type level gauge, Henri System Holland B.V. FTLG 807 SUS/T391**  
 Location : **Cargo tank dome, 1 per each Cargo tank half**

**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? : **Female 1/2" parallel coupling to ISO 228-1 2003.**

16.2 Same question for cargo : **Sampling connection at outlet of each cargo Pump (PT1/2)**

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) : **76.00 M**  
 - distance from stem (FP) (S / P) : **76.20 M**  
 - height above deck : **1.43 M for 14" Liquid manifold**  
 - distance from ship's rail : **3.50 M**  
 - underside keel to manifold : **19.01 M**

17.3 Liquid line

- flange-size : **14" X 1, 10" X 1**  
 - type : **14" & 10" ANSI 300LB**

Gas line

- flange-size : **10" X 1, 6" X 1**  
 - type : **10" & 6" ANSI 150LB**

17.4 What reducers on board? : **Stainless steel 304L pieces supplied**

**For Liquid line (low temperature)**

**14" ANSI 300LB to 16" ANSI 150LB, 12" ANSI 150LB, 10" ANSI 150LB, 8" ANSI 150LB**  
**10" ANSI 300LB to 12" ANSI 150LB, 10" ANSI 150LB, 8" ANSI 150LB, 6" ANSI 150LB**

**For Vapor line (normal temp)**

**10" ANSI 150LB to 12" ANSI 150LB, 10" ANSI 150LB, 8" ANSI 150LB, 6" ANSI 150LB**  
**6" ANSI 150LB to 8" ANSI 150LB, 6" ANSI 150LB, 4" ANSI 150LB, 3" ANSI 150LB**

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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 : **N/A**  
 Length : **N/A**  
 Diameter : **N/A**  
 Flange-size : **N/A**  
 Type : **N/A**  
 Bending radius : **N/A**

18.2 Minimum temperature acceptable : **N/A**  
 Maximum pressure acceptable : **N/A**

18.3 For what products are hoses suitable? : **None**

**19. DERRICKS**

- Hose cranes : **1 set**  
 - Where situated : **Mid-ship (center)**  
 - Lifting capacity : **10.0 tons at 10m/min**  
 - Working radius : **MAX. 22.0 m ~MIN. 4.9 m**

**20. SPECIAL FACILITIES**

20.1 How many grades can be segregated? : **Four (4) Grades**  
*Load 4 (four) grades of cargoes  
 (2 must not require cooling, refer to  
 cargo operation manual.)*

20.2 How many cooled? : **Two (2) Grades**

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