VESSEL PARTICULARS (FORM C)
LPG/C ECO GREEN
Last Update 04/03/2021

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name	:	**ECO GREEN**
Owner	:	**ECOPROPANE INC.**
Flag	:	**MARSHALL ISLANDS**
Build	:	**STX Offshore & Shipbuilding**
Date on Service	:	**SEPTEMBER 25TH 2015**
Class	:	**BUREAU VERITAS (BV)**
Hull Number	:	**B - 5066**

GRT International	:	**5452 ton**	Suez	:	**5882.56 ton**
			Panama	:	**19316 m^3**
NRT International	:	**1635 ton**	Suez	:	**4377.82 ton**
			Panama	:	**4695 ton**
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	:	**99.95**	**M**
LBP	:	**94.95**	**M**
Breadth	:	**18**	**M**
Depth	:	**8**	**M**
Summer Draft	:	**6.7**	**M corresponding to Summer DWT = 5198.3t**
Multiple Draft		**N/A**	

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%)	5.490	6.092	5.791	3739.9
Butadiene (98%)	5.770	6.217	5.994	4038.8
VCM (98%)	6.563	6.834	6.698	5111.8

Propeller immersion :

At draft	**At**	**6.24 m correspond.**	**:**	**145.8 %**
At draft	**At**	**6.29 m correspond.**	**:**	**147.0 %**
At draft	**At**	**6.65 m correspond.**	**:**	**155.8 %**

COMMUNICATION EQUIPMENT

Call letter		:	**V7MJ6**
Radio Station normally watched		:	**CH. 16 / CH. 70**
Radio MF/HFNBDP		:	**1set / FURUNO**
Radio MF/HFTEL/DSC		:	**1set / FURUNO**
VHF		:	**2sets / FURUNO**
Satellite Communication	**Inmarsat 'C'**	**:**	**1set / FURUNO**
	Inmarsat 'F'	**:**	**FBB500 1set & FBB250 1set / FURUNO**
		:	**Voice :+870 773256498 / +870 773256475**
		:	**Fax :+870 783234309**
	VSAT	**:**	**Voice1: +302 119902488** **Voice2: +302 119902489**
	E-mail	**:**	**ecogreen@stealth.gr**

MACHINERY

Main Engine x 1	. Type and make	:	**STX - MAN B&W5S35ME-B9.2**
	. Service power	:	**3,303 KWx161.2 rpm (90%SMCR)**
	No of Cylinders		**5**
	Cyl Bore x Stroke		**350 mm x 1550 mm**
	. Grade of fuel used	:	**HFO having a viscosity of not more than 380cst @ 50°C**
Auxiliaries 1	Type and make (Electrical)		**STX NIIGATA 6L17AHX** **570 kW x AC 450V x 3 phase x 60 Hz**
	(Mechanical)		**4 stroke x600kW X 900rpm**
	Grade of fuel used		**HFO (Up to 380 cSt at 50℃)**
	No off		**2**
Auxiliaries 2	Type and make (Electrical)		**STX NIIGATA 5L17AHX** **470 kW x AC 450V x 3 phase x 60 Hz**
	(Mechanical)		**4 stroke x500kW X 900rpm**
	Grade of fuel used		**HFO (Up to 380 cSt at 50℃)**
	No off		**1**
Emergency Gen	Type		**STX 6CT8.3DMGE, 100 kW x 1800 rpm** **3 phase, 60 Hz**
	No off		**1**
Boiler/Exhaust Economiser	Type		**KANGRIM RP-130M (OILON), Composite Boiler**
	Evaporation		**1,000 kg/h for oil fired section** **600 kg/h for exh. gas section at NCR load of M.E.**

	Max Design Pressure	**9 kg/cm^2**
	Feed Water Temp	**80℃**
	No off	**1**
Bow Thruster	Type	**N/A**
Air Compressors (Main)	Type / Capacity	**DONGHWA PNEUTEC CO.,Ltd.H-63 - Vertical, EMD driven, 2-stage, F.W cooled type / 60m^3 / Hr**
	No off	**2**
Air Compressors (Emergency)	Type	**One of the two main air compressors is used as the emergency air compressor**
	No off	
Fuel Oil Purifier	Type	**GEAOSE 5-0136–037/5 – Centrifugal**
	No off	**2**
	Capacity	**Appx. 1,150 L/H based on 380 cSt at 50℃**
Lub Oil Purifier	Type	**GEAOSE 5-91–037/4 – Centrifugal**
	No off	**2**
	Capacity	**Appx. 900 L/H based on detergent oil for crosshead engine**
Evaporator	Type	**ALFA LAVAL – AQUA-80-HWS– Low pressure evaporating, single stage, plate type with steam injector**
	Capacity	**Max. 12T/Day with S.W. temp. 32℃ and M.E. jacket water temperature of 90℃ at NCR load of M.E. together with steam injector**
Fresh Water Sterilizer	Type	**SAMKUN CENTURY CO.,LTD - JSA-3000 – Ultra Violet type**
	Capacity	**3,000 L/H**
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	**HYUNDAI-ATLAS INCINERATOR – MAXI NG50SL WS - Solid waste and sludge oil burning, single door, IMO approved type**
	Capacity	**4,300m^3/h**
Oily Water Separator	Type	**Blohm + Voss Industries TMPB-2,5– 5ppm with an oil content bilge alarm device, IMO MEPC 107 (49) approved type**
	Capacity	**2.5 ㎥/h**
Sewage Treatment plant	Type	**STX IL-SEUNG (ENVIRO+Notation.)**
	Capacity	**1 x 22 persons per day**
Hot Water Set (Calorifier unit)	No off	**SAMKUN CENTURY CO.,LTD- SE-200SE Harison Co Ltd (CFT-400-E) 200L tank Steam heating type (Electric heating of 15kW for em'cy heating) / 1 set**

Steering Gear	Type	**ROLLS ROYCE STEERING GEAR SR722 FCP Electro-Hydraulic system with 2-pump units (dual system) – (one pump to be able to supply full power)**
	Duty Capacity	**275 kNm**
	Hydraulic pump unit	**Electric motor driven, 14 Kw**

Environmentally Acceptable Lubricants (EAL) – Will be applied in Stern Tube & Bow Thruster

Speed
About: 13.5 knots up to Beaufort scale 4 and Douglas sea state 3.

CONSUMPTION/ DAY

Main Engine	**: abt 10.8 MT/ day +/- 5%**
Auxiliary Engine	**: abt 1.8 MT/ day +/- 5%**
In Port Discharging	**: abt 2.4 MT/ day +/- 5%**
In Port Idle / Loading	**: abt 1.8 MT/ day +/- 5%**
Use IGG	**: abt 2.4 MT/ day +/- 5%**
Use of Boiler	**: abt 1.4 MT/day +/- 5%**
Use of Chillers	**: abt 1.2 MT/day per unit**

Notes:
1. Speed and consumption figures at sea, are best estimated basis daily weather conditions are 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.

TOTAL Bunker tanks capacity (100%)

HFO	:	**Appx. 420 m^3**
Diesel	:	**Appx. 85m^3**
Fresh Water	:	**Appx. 200 m^3**

EFFECTIVE Bunker tanks capacity (90%)

HFO	:	**Appx. 370 MT**
Diesel	:	**Appx. 68 MT**
Fresh Water	:	**Appx. 180 MT**

(B) CARGO INSTALLATIONS

1. Transportable products and respective quantities, are calculated in accordance with IMO IGC regulations enforce

	100% (CBM)	98% (CBM)
NO.1 CARGO TANK 2	2494.515	2444.625
NO.2 CARGO TANK 2	2496.605	2446.673
T O T A L	4991.120	4891.298

	SPSV (bar g)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT) at 98%
Propane	17.65	45.0	0.459	2245
Propylene	17.65	45.0	0.470	2298
B/P Mixture	17.65	45.0	0.487	2382
n-Butane	17.65	45.0	0.548	2680
i-Butane	17.65	45.0	0.526	2572
Butadiene	17.65	45.0	0.588	2876
Butylene	17.65	45.0	0.565	2763
V.C.M.	17.65	45.0	0.872	4059 (3)
Isoprene	17.65	45.0	0.656	3208
Pentanes	17.65	45.0	0.600	2934
Pentene	17.65	45.0	0.611	2988

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): B/P mixing ratio based on Butane 35 wt% and propane 65 wt%

Note(3): VCM loadable quantity is subject to applicable loadline, present bunkers onboard and allowable trim & stability calculations

2. Other transportable products N/A

	SPSV	Ref. Temp. (°C.)	Density at Ref. Temp.	Corresponding Quantity (MT)

3. TANKS

3.1 Design pressure (Vapour) – BV-IGC : **17.65bar g (1.765 MPag)**

- USCG : **12.75 bar g (1.275 MPag)**

3.2 Valve setting : **17.65 bar g (1.765 MPag) / 12.75 bar g (1.275 MPag)**

3.3 Maximum vacuum obtainable : **Atmospheric**

3.5	Maximum temperature acceptable	:	**45 °C**
3.6	Minimum temperature acceptable	:	**-10 °C**
3.7	Hydrostatic Test Pressure	:	**26.4bar g**

4. NOMINAL LOADING RATE (M3/hr) – For Full Cargo Parcels

Nominal cargo loading rate ex-atmospheric storage with use of VRL

:	1 tank	:	**about 450 m^3 per hour for LPG**
			about 350 m^3 per hour for VCM
	2 tanks	:	**about 900 m^3 per hour for LPG**
			about 700 m^3 per hour for VCM

Remarks:

1. Loading by shore pumps under use proper size gas return line and subject to both ship and shore tanks being under similar and favourable conditions. Actual agreed rate is subject always to safe operation.
2. If cargo temperature is less than 0°C, shore heater to be used for loading. If ship's heater is used, loading rate is subject to seawater and environmental temperatures and conditions.
3. Nominal loading rate is calculated basis cargo temperature above -10deg. C with cargo densities 0.65 for LPG 0.966 for VCM and based on maximum velocity of 6.5 metres/sec except VCM, and 4.0 meters/sec for VCM in the liquid piping

5. CARGO PUMPS

5.1	Type	:	**Deepwell type of vertical centrifugal multistage design DW 200/200-3-K+I**
	Make	:	**HAMWORTHY SVANEHOJ A/S**
	How many	:	**2 (two)**
	Maximum allowable density	:	**0. 650(LPG) / 0.966 (VCM)**
5.2	Nominal Rated Capacity (CMB/Hour)	:	**450 m^3/hr @ 110 mlc (for LPG density 0.650)**
			350 m^3/hr @ 130 mlc (for VCM density 0.966)
	Two speed or variable speed	:	**Single Speed**
	Rated kW (each)		**190 kW**
	Max. Allowable working pressure	:	**20 bar g**
5.3	Location	:	**1 (one) pump per cargo tank**
	Removable	:	**Yes**
5.4	Booster pumps	:	**1 (one) horizontal centrifugal single stage**
	Type	:	**NMB 150c**
	Maker	:	**Svanehoj - Wartsila**
5.5	Nominal Rated Capacity (CMB/Hour)	:	**350 m^3/hr @ 120 mlc**
	Max. Allowable working pressure	:	**23 bar g**
5.6	Location	:	**On top of No.2 Cargo tank**
5.7	Time to discharge a full propane liquid cargo using all pumps against back pressure at pump		
	1 bar	:	**13 hrs**
	5 bars	:	**33 hrs**
	10 bars	:	**N/A**
5.8	Nominal pressure when working	:	**about 7.5 barg @ 130 mlc (Propane)**
	In series corresponding head	:	**N/A**
	Maximum back pressure	:	**8.0 barg**

Nominal pressure at rail : **5.5 barg (Popane)**

5.9 What amount of cargo remains in tanks after completion pumping before stripping:
- liquid : **about 30 m^3 per one tank**
- vapour : **about 55 m^3 per one tank**

6. STRIPPING

6.1 Stripping system, if any : **Hot gas – puddle heating / vapour pushing via cargo compressors**

6.2 Time required to remove all traces of liquid cargo as stated in 5.9 for:
- LPG : **about 6.0 hours for liquid puddle heating**

7. CARGO COMPRESSORS

7.1 Type : **Vertical water cooled 1 stage double acting LPGOS-97S**
Make : **Tanabe pneumatic machinery Co Ltd**
How many : **3 sets**
Piston displacement **510m3/h**
Rated Kw **100 kW**
Stroke **177.8 mm**
Max discharge pressure **20 bar g**
Pressure differential **7 bar**
Max 7 bar at single action
No of Revolutions **592 rpm**

7.2 Are compressors oil free : **Yes**

7.3 Can they re-liquefy VCM without risk : **N/A**

7.4 State time to bring full cargo of butane to atmospheric pressure : **N/A. Chiller units on each cargo compressor are used only to maintain the cargo temperature in the cargo tanks.**

8. INERT GAS SYSTEM

8.1 Does the vessel use inert gas? : **Yes (N2)**
If so, state utilization and quantities : **Deck service and Source for Air bubbling, 18 EA**

8.2 Can the vessel produce inert gas? : **Yes (N2)**
If so, state type and composition of gas produce:
Nitrogen: 97 % to 99.9% **Capacity @ N2 purity 99.90% 250 Nm3/h**

N2 purity obtainable at cargo tanks : **99.80%**

8.3 Maximum production obtainable : **250 Nm3/h**
NOTE:- Above quantities obtained at engine room temperature 45° C

8.4 State if there are storage facilities for inert gas onboard: **Yes**
- Size : **2 m3**
- Pressure : **7 Bar g**

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 : **About 164 hrs**

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 0.2% by volume of Propane in Vapour phase.

N2 production required: about 20,000 cbm – Time required: about 86 hrs

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 : -
Purpose : -

11. COOLING BEFORE LOADING :

12. CARGO HEATER

12.1	Type	:	**Shell and Tube**
12.2	Inside Diameter		**800 mm**
12.3	Overall length		**7500 mm**
12.4	Cargo flow rate		**450 m3/h (Propane)**
12.5	Min Inlet Temp		**-48 °C**
12.6	Min Outlet Temp		**0 °C**
12.7	Required Sea water Capacity		**700 m3/h (Min seawater temp 15°C)**
12.8	Design Pressure		**25 bar g**
12.9	Hydrostatic Test Pressure		**37.5 bar g**
12.10	Tightness Test Pressure		**25 bar g**

12.11 State nominal loading rate of propane to be brought from –minus 42°C to 0°C:

About 450 m3/hr (propane) with seawater temp above 15°C and seawater flow of 700 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 **3 (three) Chiller units on each cargo compressor. Chillers are used only to maintain constant cargo temperature in the tanks.**

14.1 Is it independent of cargo? : **N/A**
Is so, state cooling agents : **-**

14.2 What minimum temperature can be maintained : **-8.0 deg C**

4.3 What time required at sea to lower by 1°C the full cargo (basis air temp +45 deg.C and sea temp +30 deg. C and two chiller units in operation : **Propane**
20°C to 19°C : abt 2 hrs
0°C to -1°C : abt 7 hrs
-7°C to -8°C : abt 16 hrs
N-Butane
20°C to 19°C : abt 6.5 hrs
1°C to 0°C : abt 45 hrs

15. MEASURING APPARATUS

What gauges on board?

Type : **Float type level gauge / HSH type (manual)**

Location : **1 (one) fitted each cargo tank – dome area**

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 : Yes

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 bow : **45.075 m**
- distance form stem : **54.875 m**
- height above deck : **Abt. 1.60 m (Liquid manifold)**
- distance from ship's rail : **Abt. 2.44 m**
- underside keel to manifold : **Abt. 9.61 m**

17.3 Liquid line (2)

- flange-size : **8 inches (x2)**
- type : **ANSI 300 LB RF**

Gas line (4)

- flange-size : **6 inches (x2) & 4 inches (x2)**
- type : **ANSI 300 LB RF**

17.4 What reducers on board? : **26 carbon steel pieces supplied**

For Liquid line (low temperature)

8" ANSI 300 TBA to : See table

For Vapor line (normal temp.)

6" ANSI 300 TBA to : See table

4" ANSI 300 TBA to : See table

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? **N/A** :

19. DERRICKS

- Hose cranes	:	**1 set**
- Where situated	:	**Mid-ship**
- Lifting capacity	:	**5.0 tons @ 10m/min**
- Working radius	:	**15m**

20. SPECIAL FACILITIES

20.1	How many grades can be segregated?	:	**Double Grade**
20.2	How many cooled?	:	**Two**
20.3	Can vessel sail with slack cargo tanks?	:	**Yes**

21. BWTM

Maker : Panasia

Model : GloEn – P300

Capacity at ballasting : 300 m3/hr

Capacity at de-ballasting: 300 m3/hr

Filtration degree : 50 micron

Working principle: UV(e.g. UV) Model No : PU250