

VESSEL PARTICULARS (FORM C)
 ECO DOMINATOR LPG/C 7200 M³
 DATE 14/09/19

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

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name : **ECO DOMINATOR**

Owner : **SENIOR INVESTMENTS INC.**

Flag : **REPUBLIC OF MARSHALL ISLANDS**

Build : **KYOKUYO SHIPYARD CORPORATION**

Date on Service : **27/06/2016**

Class : **ABS**

GRT International : **5,320 ton** Suez : **6,008.77 ton**
 Panama : **18,643 m³**

NRT International : **1,995 ton** Suez : **5,001.99 ton**
 Panama : **4,529 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 : **117.03 M**

LBP : **110.00 M**

Breadth : **18.20 M**

Depth : **8.90 M**

Summer Draft : **6.814 M corresponding to Summer DWT = abt. 5,891 t**

Multiple Draft : **Nil**

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%)	5.44	7.44	6.44	5,336
Butadiene (96%)	6.08	7.45	6.77	5,873
VCM (65%)	6.09	7.44	6.77	5,873

Propeller immersion :

At draft At 7.44 m correspond. (Propane cond.) : 135 %
 At draft At 7.45 m correspond. (Butadiene cond.) : 136 %
 At draft At 7.45 m correspond. (VCM cond.) : 135 %

COMMUNICATION EQUIPMENT

Call letter		:	V7SJ5
Radio Station normally watched		:	Yes
Radio MF/HF NBDP		:	FS-2575 include
Radio MF/HFTEL/DSC		:	FS-2575 include
VHF		:	FM-8900S 2sets
Satellite Communication	Inmarsat 'C'	:	453842827 ECDO X
	Inmarsat 'FBB'	:	(Voice) 870 773257467
		:	(Fax) 870 783239182
		:	(E-mail) ecodominator@stealth.gr

MACHINERY

Main Engine x 1	Type and make	:	MAN B&W 6L35MC6.1
	Service power	:	3,510 Kw (4,772ps) x 203 rpm (90%MCO)
	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°C
Auxiliaries	Type and make (Electrical)		Yanmar 6NY16L-EW
	(Mechanical)		rated 400 Kw x 450V x 3 phase x 60 Hz
	Grade of fuel used		4 stroke x 441 Kw x 1,200 rpm
	No off		Diesel Oil - 3,6 cSt – 14 cSt 2
Emergency Gen	Type		STX Engine NT855DMGE – 200Kw, AC 450V, 3 phase, 60 Hz
	No off		1
Boiler	Type		Alfa Laval KK (Aalborg OC) Fully automatic smoke-tube composite boiler
	Evaporation		500 Kg/Hr (Exhaust gas)
	Max Design Pressure		0.69 Mpa Saturated
	Feed Water Temp		60°C
	No off		1
Bow Thruster Type :			Power: 310 KW (Maker: Kawasaki)
Exhaust Economiser	Type		Composite Boiler
	Evaporation		750Kg/Hr (Oil fired)
	No off		1
Air Compressors (Main)	Type / Capacity		Matsubara (MH-120K) - Vertical, 2-stage, F.W cooled type / 85.0m³/ Hr
	No off		2
Air Compressors (Emergency)	Type		TBA
	No off		1
Fuel Oil Purifier	Type		Mitsubishi SJ20G – Centrifugal
	No off		2

	Capacity	1150 Ltrs / Hr, 700mm ² /s at 50°C
Lub Oil Purifier	Type	Mitsubishi SJ20G – Centrifugal
	No off	1
	Capacity	1950 Ltrs / Hr, 100/150mm ² /s at 40°C
Evaporator	Type	Sasakura Engineering Co. Ltd. (KE-10) – Waste heat recovery
	Capacity	1 x 10 t/day
Fresh Water Sterilizer	Type	Nippon Control's Co.,Ltd. – Electric Germicidal lamp with filter
	Capacity	1 x1,000 litre/h
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	Sunflame Co. Ltd. (OSV-360SAI) – Rotary cup system
	Capacity	Oil @ 38 lit/h & Solids @ 30 Kg/h
Oily Water Separator	Type	Heishin Pump Works Co., Ltd.
	Capacity	1 x 1.0 m ³ /h
Sewage Treatment plant	Type	Taiko Kikai Industries Co, Ltd (SBH-25)- Activated sludge aeration (Biological) – USCG certified
	Capacity	1 x 25 persons per day
Hot Water Set (Calorifier unit)	No off	Toyo Dennetsu Kogyo Co., Ltd. (TTS-400) 400L with 1 x 1.1m ² steam heater / 1 set
Steering Gear	Type	Kawasaki Heavy Industries, Ltd. Electro-Hydraulic system (RV21-022) with 2-pump units (dual system) – (one pump to be able to supply full power)
	Duty Capacity	22.4 t-m
	Hydraulic pump unit	Electric motor driven, 2 x 5.5 Kw

Speed

In Moderate weather:

Service speed on the designed draught at the continuous service output of 3,510 kW (90% MCO) of main engine with 15% sea margin **abt. 14.8 Knots**

CONSUMPTION/ DAY

Main Engine	HFO	177.4g/kw-hr (with +5%) at NOR (179g/kw-hr (with +5%) at MCR)	16.50 ton/day (18.5 ton/day)
Auxiliary Engine	DO	201g/kw-hr (with +5%) at max	2.20 ton/day (for 1set)
In Port Discharging	DO	2 Generator Running	2.20 ton/day
In Port Idle / Loading	DO	1 Generator Running	1.10 ton/day
Use Nitrogen Generator	DO	2 Generator Running	1.60 ton/day
Use of Boiler	DO	1 Generator Running	1.60 ton/day
Use of Cargo Re-heater	DO	2 Generator Running	2.20 ton/day

Permanent bunker
capacity (100%)

HFO : **492.64 m³** (*Fuel oil bunker tanks are DH*)

Diesel : **69.28 m³** (*Diesel oil bunker tanks are DH*)

Fresh Water : **193.06 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	3612.217	3539.972		
NO.2 CARGO TANK	3611.559	3539.328		
T O T A L	7223.776	7079.300		
	SPSV (MPaG)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	1.77	45.0	0.456	3217
Propylene	1.77	45.0	0.467	3295
B/P Mixture	1.77	45.0	0.487 * 2	3436 * 2
I-Butane	1.77	45.0	0.521	3676
N-Butane	1.77	45.0	0.549	3873
Butylene	1.77	45.0	0.560	3951
Butadiene	1.77	45.0	0.588	4148
V.C.M.	1.77	45.0	0.867	6117 * 3
Isoprene	1.77	45.0	0.614	4332 * 3
Pentane	1.77	45.0	0.600	4233
Pentene	1.77	45.0	0.616	4346
B/P Mixtures	1.27	45.0	0.487 * 2	3436 * 2
N-Butane	1.27	45.0	0.549	3873
I-Butane	1.27	45.0	0.521	3676
Butadiene	1.27	45.0	0.588	4148
Butylene	1.27	45.0	0.560	3951
V.C.M.	1.27	45.0	0.867	6117 * 3
Isoprene	1.27	45.0	0.614	4332 * 3
Pentane	1.27	45.0	0.600	4233
Pentene	1.27	45.0	0.616	4346

Note(1): In case of there is no request by USCG, setting pressure of safety valve may use 1.77 MPaG . Propylene, Propane and Butane/Propane Mixtures are to be carried. In case of there is request by USCG, propylene, propane and Butane/Propane mixtures are not to be carried except the vapour pressure of Butane/Propane mixtures is not more than 1.27 MPaG @ 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%

Note (3): Figures are preliminary *Subject to change according to displacement

Loading weight of VCM and Isoprene shall be determined according to the damaged stability of vessel and max. Loading weight of VCM and Isoprene shall be determined by shipyard.

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 : 17.65 bar 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	:	TBA

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

Ex-atmospheric storage with gas	:	1 tank	:	about 730 m³ per hour for LPG
Return	:		:	about 560 m³ per hour for VCM
	:	2 tanks	:	about 1130 m³ per hour for LPG
	:		:	about 870 m³ per hour for VCM

Remarks:

- * If cargo temperature is less than -10 °C, shore heater to be used. If ship heater used, max rate is **550 m³** per hour.
- * Based on maximum velocity of 6.5 metres/sec except VCM, and 5.0 meters/sec for VCM in the liquid piping.
- * 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	:	WARTSILA SVANEH ϕ J A/S
	How many	:	1 set per tank (2 sets)
	Maximum specific gravity	:	0.601(LPG) / 0.965 (VCM)
5.2	Capacity (CMB/Hour)	:	400 m³/hr at 110 m (SG 0.601) 200 m³/hr at 138 m (SG 0.965)
	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	:	Not removable
5.4	Booster pumps	:	1 set
	Type	:	Horizontal, totally enclosed, 3 phase squirrel caged shape induction motor
	Maker	:	WARTSILA SVANEH ϕ J A/S
5.5	Capacity (CMB/Hour)	:	400m³/h x 110 m (density 0.610)
	Working pressure	:	22 bar g
5.6	Location	:	Platform near the manifold
5.7	Time to discharge a full liquid cargo using all pumps against back pressure at pump	:	
	1 bar	:	about 21 hours for LPG
	5 bars	:	about 60 hours for LPG
	10 bars	:	-----
5.8	Nominal back pressure when working	:	about 1 bar
	In series corresponding head	:	220 ml.c.
	Maximum back pressure	:	about 10 bar
	Nominal pressure at rail (propane)	:	about 18 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 m³ per one tank
- vapour : about 40 ton per one tank

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 single bore, double acting, water cooled, oil-less compressor
Make : Tanabe pneumatic machinery Co Ltd
How many : 2 sets
Piston displacement : 467m³/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 : 450 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 (Nitrogen Generator)
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: 97 % to 99.9% Capacity (discharge) @ 97.00% N₂ is 360 Nm³/h
Capacity (discharge) @ 99.00% N₂ is 280 Nm³/h
Capacity (discharge) @ 99.90% N₂ is 185 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 : **Horizontal shell and Tube**

12.2 Inside Diameter **850 mm**

12.3 Overall length **7000 mm**

12.4 Cargo flow rate **550 m3/h (Propane base)**

12.5 Min Inlet Temp **-48 °C**

12.6 Min Outlet Temp **-10 °C**

12.7 Required Sea water Capacity **600 m3/h (Min 18°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 / minus10 ° C: about 300 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 : **1set each tank beside tank dome**
1set each tank at 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 PT1/4 thread**
- 16.2 Same question for cargo : **Sampling connection at outlet of each cargo Pump (JIS PT1/4 thread)**
- 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) : **62.32 M**
 - distance form stem (FP) (S / P) : **54.70 M**
 - height above deck : **1.553 m for Liquid manifold**
 - distance from ship's rail : **2.400 M**
 - underside keel to manifold : **10.453 M**
- 17.3 Liquid line
- flange-size : **10 in.**
 - type : **10" ANSI 300LB**
- Gas line
- flange-size : **6 in.**
 - type : **6" ANSI 300LB**
- 17.4 What reducers on board? : **Carbon steel pieces supplied**
- For Liquid line (low temperature)**
10" ANSI 300LB to **12" ANSI 300LB, 8" ANSI 300LB, 6" ANSI 300LB**
5" ANSI 300LB, 4" ANSI 300LB, 3" ANSI 300LB
10" ANSI 150LB, 8" ANSI 150LB, 6" ANSI 150LB
5" ANSI 150LB
- For Vapor line (normal temp.)**
6" ANSI 300LB to **8" ANSI 300LB, 5" ANSI 300LB, 4" ANSI 300LB,**
3" ANSI 300LB, 2" ANSI 300LB
8" ANSI 150LB, 6" ANSI 150LB, 5" ANSI 150LB,
4" ANSI 150LB, 3" ANSI 150LB
- 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	:	5.0 tons @ 10m/min
	- Working radius	:	14.1m
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
21. WATER BALLAST TREATMENT			
21.1	MAKER	:	GloEn (PANASIA)
21.2	MODEL	:	GloEn- P250 x 1 set
21.3	CAPACITY AT BALLASTING	:	250 m3/hr
21.4	CAPACITY AT DEBALLASTING	:	250 m3/hr
21.5	FILTRATION DEGREE	:	50 micron
21.6	WORKING PRINCIPLE	:	UV
21.7	UV model No.	:	A 250-316L / PU 250
21.8	COUNTRY OF MAKER	:	Republic Of Korea