

VESSEL PARTICULARS (FORM C)

LPG/C 3,500 M³

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

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name : **ECO ELYSIUM**
Owner : **CALBASAS INDUSTRIES INC.**
Flag : **MARSHALL ISLANDS**
Build : **KITANIHON SHIPBUILDING CO., LTD.**
Date on Service :
Class : **AMERICAN BUREAU OF SHIPPING (ABS)**
+A1, ®, Liquefied Petroleum Gas Carrier with Independent Tanks,
+AMS, +ACCU, GP, BWT, CPS, TCM, UWILD,
(Liquefied Petroleum Gas Carrier, Maximum Vapor Pressure 1.765 MPa,
Minimum Temperature -10 degree C, Ship Type 2PG)

GRT International : **Abt. 3,400** Suez : **Not yet ton**
Panama : **Not yet m3**

NRT International : **Not yet** Suez : **Not yet ton**
Panama : **Not yet ton**

Is vessel build according to USCG regulations? : **N/A**
RINA regulations? : **N/A**
Japanese regulation? : **N/A**

Has vessel received USCG approval? : **N/A**
(for foreign vessel in US water)
RINA approval? : **N/A**

HULL

LOA : **95.00 M**
LBP : **89.00 M**
Breadth : **15.96 M**
Depth : **7.10 M**
Summer Draft : **5.512 M Summer DWT = abt 3,700 t TPC 12.77**

Air draft at full load conditon : **24.80 M**

Air draft at ballast load conditon : **25.95 M**

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%) | 4.65 | 5.54 | 5.04 | 3,193.9 |
| Butadiene (98%) | 5.12 | 5.66 | 5.39 | 3,636.9 |
| VCM (98%) | 4.30 | 6.62 | 5.46 | 3,783.5 |
| Propylene (98%) | 4.69 | 5.46 | 5.07 | 3,231.7 |
| n-butane (98%) | 4.97 | 5.59 | 5.28 | 3,499.5 |
| i-butane (98%) | 4.89 | 5.56 | 5.22 | 3,424.0 |

Propeller immersion :

| | | | | | |
|------------------|------------------|-----------|---------------------------|----------|--------------|
| Propane | Aft draft | At | 5.44 m correspond. | : | 93 % |
| Butadiene | Aft draft | At | 5.66 m correspond. | : | 100 % |
| VCM | Aft draft | At | 6.62 m correspond. | : | 127 % |
| Propylene | Aft draft | At | 5.46 m correspond. | : | 94 % |
| n-Butane | Aft draft | At | 5.59 m correspond. | : | 98 % |
| i-Butane | Aft draft | At | 5.56 m correspond. | : | 97 % |

COMMUNICATION EQUIPMENT

| | | | |
|--------------------------------|---------------------|---|---------------------|
| Call letter | | : | Not yet |
| Radio Station normally watched | | : | GMDSS |
| Radio MF/HF NBDP | | : | JRC JSS-2250 |
| Radio MF/HF TEL/DSC | | : | JRC JSS-2250 |
| VHF | | : | |
| Satellite Communication | Inmarsat 'C' | : | JRC JUE-87 |
| | Inmarsat 'F' | : | JRC JUE-501 |
| | | : | |

MACHINERY

| | | | |
|---------------------------|-------------------------------|---|--|
| Main Engine x 1 | Type and make | : | MAKITA CORPORATION 5L35MC6.1 |
| | Service power | : | 2,125 kw (2,890 ps) x 168.6 rpm (85%MCR) |
| | No of Cylinders | | 5 |
| | 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) | | NISHISHIBA A.C. drip proof, self-vent lated 360 kw x 450V x 3 phase x 60 Hz |
| | (Mechanical) | | YANMAR(6N165L-EW) 4 stroke x 397 kw x 900 rpm |
| | Grade of fuel used No off | | Heavy Oil or Diesel Oil - 380cst @ 50°C 2 |
| Emergency Gen | Type | | Cumminus Generator Technologies (HC, M434D1) 200kw, AC 450V, 3 phase, 60 Hz |
| | No off | | 1 |
| Boiler | Type | | Miura Co., Ltd. (GK-1424-600/300) Vertical water tube, composite boiler |
| | Evaporation | | OIL BURNING SIDE : 600 kg/hr EXH. GAS SIDE : 300 kg/hr at M/E CSO |
| | Max Design Pressure | | 0.7 MPa Saturated |
| | Feed Water Temp | | 60°C |
| | No off | | 1 |
| Exhaust Economiser | Type | | NIL |
| | Evaporation | | NIL |
| | No off | | NIL |

| | | |
|--|---------------------|---|
| Air Compressors (Main) | Type / Capacity | Yanmer (SC-10N) 45.0 m³ / hr x 2.94 MPa |
| | No off | 2 |
| Air Compressors (Emergency) | Type | Yanmer (KSC-3) 7.7 m³ / hr x 2.94 MPa |
| | No off | 1 |
| Fuel Oil Purifier | Type | Mitsubishi (SJ-10) |
| | No off | 2 |
| | Capacity | 900 ltrs/hr (380mm²/s at 50 deg.C) |
| Lub Oil Purifier | Type | Mitsubishi (SJ-10) |
| | No off | 2 |
| | Capacity | 500 ltrs/hr (100mm²/s at 40 deg.C) |
| Evaporator | Type | Miura (GK-1424-600/300) |
| | Capacity | 1 x 600 kg/h x 0.5 ~ 0.6 MPa |
| Fresh Water Sterilizer | Type | Alfa-Laval (JWP-16-C50) |
| | Capacity | 1 x10 t/day (with heater) or 6 t/day (without heater) |
| Fresh Water Mineraliser | Type / Capacity | NILL |
| Waste Oil Incinerator | Type | Miura (BGW-10N) |
| | Capacity | Oil @ 24.3 lit/h & Solids @ 10 kg/h |
| Oily Water Separator | Type | Taiko (USH-10) |
| | Capacity | 1 x 1.0 m³/h |
| Sewage Treatment plant | Type | Taiko (SBH-25) |
| | Capacity | 1 x 25 persons per day |
| Hot Water Set (Calorifier unit) | No off | Harison (CFL-1002) 1 x 1,000 ltr/hr |
| Steering Gear | Type | Electro-Hydraulic 1-ram 2-cylinder Rapson-Slide type |
| | Duty Capacity | 13.3 t-m |
| | Hydraulic pump unit | Electric motor driven, 2 x 3.7 kW (one unit stand-by) |

Speed

In Moderate weather:

About: 13.0 Knots @ CSR with 15% sea margin at Scantling draft condition

About: 13.5 Knots @ CSR with 15% sea margin at Design draft condition

CONSUMPTION/ DAY

Main Engine HFO **177.2g/kw-hr (with +5%) at NOR at Full load/Ballast 9.5 ton/day**

Aux. Engine DO

Permanent bunker
capacity (100%)

| | | |
|-------------|---|-----------------------------|
| HFO | : | 451.08 m³ |
| Diesel | : | 107.40 m³ |
| Fresh Water | : | 176.21 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 | 1,750 | 1,715 | | |
| NO.2 CARGO TANK | 1,750 | 1,715 | | |
| TOTAL | 3,500 | 3,430 | | |
| | SPSV (bar g) | Ref. Temp. (deg. C.) | Density at (Ref. Temp.) | Corresponding Quantity (MT) at 98% |
| Propylene | 17.65 | 45.0 | 0.470 | 1,612 |
| Propane | 17.65 | 45.0 | 0.459 | 1,574 |
| B/P Mixture | 17.65 | 45.0 | 0.487 | 1,670 |
| n-Butane | 17.65 | 45.0 | 0.548 | 1,879 |
| i-Butane | 17.65 | 45.0 | 0.526 | 1,804 |
| Butadiene | 17.65 | 45.0 | 0.588 | 2,016 |
| Butylene | 17.65 | 45.0 | 0.565 | 1,938 |
| V.C.M. | 17.65 | 45.0 | 0.872 | 2,990 |
| Isoprene | 17.65 | 45.0 | 0.656 | 2,250 |
| Pentanes | 17.65 | 45.0 | 0.600 | 2,058 |
| Pentene | 17.65 | 45.0 | 0.611 | 2,095 |
| B/P Mixtures | 12.75 | 45.0 | 0.487 | 1,670 |
| n-Butane | 12.75 | 45.0 | 0.548 | 1,879 |
| i-Butane | 12.75 | 45.0 | 0.526 | 1,804 |
| Butadiene | 12.75 | 45.0 | 0.588 | 2,016 |
| Butylene | 12.75 | 45.0 | 0.565 | 1,937 |
| V.C.M. | 12.75 | 45.0 | 0.872 | 2,990 |
| Isoprene | 12.75 | 45.0 | 0.656 | 2,250 |
| Pentanes | 12.75 | 45.0 | 0.600 | 2,058 |
| Pentene | 12.75 | 45.0 | 0.611 | 2,095 |

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/cm² @ 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

3. TANKS

- 3.1 Design pressure (Vapour) - IGC : 17.65 bar g (1.765 MPa g)
- USCG : 12.75 bar g (1.275 MPa g)
- 3.2 Valve setting : 17.65 bar g (1.765 MPa g) /
12.75 bar g (1.275 MPa g)
- 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 : 26.48 bar g (2.648 MPa g)

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

Ex-atmospheric storage with gas : 1 tank : about m³ per hour
return : 2 tanks : about m³ per hour

Remarks:

5. CARGO PUMPS

- 5.1 Type : Deepwell type of vertical centrifugal multistage design
Make : Wartsila Svanehoj
How many : 1 set per tank (2 sets)
Maximum specific gravity : 0.948
- 5.2 Capacity (CMB/Hour) : 300 m³/hr at 110 m (SG 0.601)
250 m³/hr at 130 m (SG 0.948)
Two speed or variable speed : Single Speed
Rated kW (each) : 130 kW
Working pressure maximum :
- 5.3 Location : At each cargo tank
Removable : Yes
- 5.4 Booster pumps :
Type : Horizontal Centrifugal
Maker : Wartsila Svanehoj
- 5.5 Capacity (CMB/Hour) : 300 m³/hr at 100 m (SG 0.601)
250 m³/hr at 130 m (SG 0.948)
Working pressure :
- 5.6 Location : On upper deck side
- 5.7 Time to discharge a full liquid cargo using all pumps against back pressure at pump
1 bar :
5 bars :
10 bars :
- 5.8 Nominal back pressure when working :
In series corresponding head :
Maximum back pressure :
Nominal pressure at rail (propane) :
- 5.9 What amount of cargo remains in tanks after completion pumping before stripping:
- liquid :
- vapour :

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 :

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 : **Gas freeing, Inerting, Airing**

8.2 Can the vessel produce inert gas? : **Yes (N2)**
If so, state type and composition of gas produce:
Nitrogen: 97.0 % to 99.9% : **415Nm3/h @N2 97.0%**
: **335Nm3/h @N2 99.0%**
: **200Nm3/h @N2 99.9%**

Discharge Capacity : **See above**

8.3 Maximum production obtainable : **415Nm3/h @N2 97.0%**
NOTE:- Above quantities obtained at engine room temperature 45° C

8.4 State if there are storage facilities for inert gas onboard: **Nil**
- Size : **N/A**
- Pressure : **N/A**

8.5 State if any shore supply of nitrogen may be required: : **Yes. If necessary**
- for what purpose : **Gas freeing , Inerting**
- what quantities : **TBA**

9. GAS FREEING

9.1 State method used giving all details : **N/A**
9.2 State time required including stripping : **N/A**

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:
- 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** : **N/A**
- 12. CARGO HEATER**
- 12.1 Type : **Shell and Tube**
12.2 Inside Diameter : **About 700 mm**
12.3 Overall length : **About 6,430 mm**
12.4 Cargo flow rate : **250 m3/h (Propane)**
12.5 Min Inlet Temp : **-48 °C**
12.6 Min Outlet Temp : **0 °C**
12.7 Required Sea water Capacity : **450 m3/h (Min 16°C)**
12.8 Design Pressure : **20 bar g**
12.9 Hydrostatic Test Pressure
12.10 Tightness Test Pressure
- 12.0 State discharging rate for propane to be brought from atmospheric pressure : **N/A**
- 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** : **N/A**
- 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?
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? :
- 16.2 Same question for cargo :
- 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) : **48.2 m**
 - distance from stem (FP) : **40.8 m**
 - height above deck : **1.55 m for Liquid manifold**
 - distance from ship's rail : **2.20 m**
 - underside keel to manifold : **8.70 m**
- 17.3 Liquid line
- flange-size : **8 in.**
 - type : **ANSI300LB**
- Gas line
- flange-size : **5 in.**
 - type : **ANSI300LB**
- 17.4 What reducers on board? : **25 carbon steel pieces supplied**
- For Liquid line (low temperature)**
- ANSI 300LB 200A (8inch) :
 - (10-6-5-4-3)" – ANSI 300 LB (5pcs)
 - (10-8-6-5-4-3)" – ANSI 150 LB (6pcs)
 - (6-5-4)" – JIS20K (3pcs)
- For Vapor line (normal temp.)**
- ANSI 300LB 125A (5inch) :
 - (6-4-3)" – ANSI 300 LB (3pcs)
 - (6-5-4-3)" – ANSI 150 LB (4pcs)
 - (6-3)" – JIS20K (2pcs)
 - (3)" – JIS10K (1pcs)
 - (6)" – ANSI 150 LB with stud (1pcs)
- 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(center)**
- Lifting capacity : **4.0 tons**
- Working radius : **14.5m**

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**