

# VESSEL PARTICULARS (FORM C)

## LPG/C ECO NICAL

(Updated 10<sup>th</sup> July 2020)

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

### (A) VESSEL'S CHARACTERISTICS

#### PREAMBLE

Name : ECO NICAL  
Owner : DAYTONA INDUSTRIES INC.  
Flag : MARSHALL ISLANDS  
Build : MURAKAMI HIDE SHIPBUILDING Co. Ltd., Japan  
Date on Service: 05 FEBRUARY 2016

Class : NK

GRT International : 5848 ton  
Suez : 6,302.94ton  
Panama : 4,971 m3

NRT International : 2,092 ton  
Suez : 5,238.93ton  
Panama : 4,971.00ton

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

Has vessel received  
USCG approval? : NO (for foreign vessel  
in US water)  
RINA approval? : N/A

#### HULL

LOA : 119.29 M  
LBP : 112.50 M  
Breadth : 18.20 M  
Depth : 8.40 M  
Summer Draft : 6.45 M corresponding to Summer DWT = 6,407 t

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%)    | 4.46            | 6.72           | 5.59           | 4868.64                      |
| Butadiene (98%) | 5.21            | 7.24           | 6.22           | 5971.26                      |
| VCM (72%)       | 5.74            | 7.21           | 6.47           | 6406.79                      |

Propeller immersion :

At draft : At 5.97 m correspond. : 97.9%  
At draft : At 6.18 m correspond. : 103.5%  
At draft : At 6.70 m correspond. : 117.3%

## COMMUNICATION EQUIPMENT

Call letter : V7QE7  
Radio Station normally watched : GMDSS  
Radio MF/HF NBDP : Yes  
Radio MF/HFTEL/DSC : Yes  
VHF : Yes

### Satellite Communication

Inmarsat 'FBB': +870 773 256212 (Voice)  
: +870 783 232486 (Fax)  
: econical@stealth.gr (E-mail)  
Sat C: 453842288

## MACHINERY

**Main Engine x 1 Type and make:** vertical, 2 cycle cross head type, diesel engine with turbo charger/HITACHI-MAN B&W  
**Service power:** 4550 Kw x 210 min-1  
**No of Cylinders:** 7  
**Model:** 7L35MC6.1  
**Cyl Bore x Stroke:** 350 mm x 1050 mm x 2 stroke

**Grade of fuel used:** IFO 380 mm2/s@ 50°C

**Auxiliaries Type and make:** Vertical, 4 cycle, single acting, trunk piston type diesel engine Yanmar  
**Model:** 6N165L-UW  
**Rated output:** 441 Kw (600PS)x 1,200 min-1  
**Electrical Generator:** 500KVA, 400Kw AC 445V, 3phases, 60Hz  
**Grade of fuel used:** M.D.O (Maximum 65 sec. Redwood No.1 @ 100deg°C

**No off 2**

**Emergency Gen Type:** Deutz Air Cooled Diesel Engine  
AC 450V, 3Ø 60Hz 80KVA

**No off :** 1

**Boiler Type:** Natural Circulation Vertical Water Tube  
**Maker:** MIURA CO. LTD.  
**Model:** VWH-800E  
**Max Design Pressure:** 0.70 Mpa  
**Actual Evaporation:** 717 kg/hr  
**Grade of fuel used:** I.F.O(380 mm2/s @ 50 degc  
**No off:** 1

**Exhaust Economizer Type:** Circulation Type (Fin tube)  
**Maker:** Miura (KF-105F)  
**Output:** 560Kg/(90%)  
**No off:** 1

**Air Compressors (Main)** Type / Capacity: Sauer Air Cooled Piston Compressor (WP 65L)  
2 Stage / 80m3.Hr  
No off: 2

|   |  |  |
|---|--|--|
| <b>Air Compressors<br/>(Emergency)</b>                  | Type:<br>No off:                                   | Sauer Air Cooled Piston Compressor (WP 15L)<br>2 Stage / 18m3.Hr<br><b>1</b>   |
| <b>Fuel Oil Purifier</b>                                | Type:<br>No off:<br>Capacity:                      | Alfa Laval Flex System 615<br><b>2</b><br><b>900 Ltrs / Hr at 98°C</b>   |
| <b>Lub Oil Purifier</b>                                 | Type:<br>No off:<br>Capacity                       | Alfa Laval Flex System 615<br><b>1</b><br><b>1100 Ltrs / Hr at 90°C</b>  |
| <b>Evaporator</b><br>Capacity <b>1 x 9.6 t/day</b>      | Type:  | Alfa Laval – (JWP-26-C80) Waste Heat Recovery  |
| <b>Fresh Water<br/>Sterilizer</b>                       | Type:<br>Capacity:                                 | <b>Nippon Controls Co. Ltd. (L-N201F) Electric<br/>UV Lamp with Filter</b><br><b>1 x 2,000 liter/h</b>   |
| <b>Fresh Water<br/>Mineraliser</b>                      | Type / Capacity:                                   | NIL  |
| <b>Waste Oil<br/>Incinerator (IMO<br/>MEPC 76 (40))</b> | Type:<br>Capacity:                                 | <b>Miura Protec Co Ltd (BGW-20N - Horizontal air atomizing<br/>type with aux burner</b><br><br><b>Oil @ 24.3 lit/h &amp; Solids @ 20 Kg/h</b>  |
| <b>Oily Water Separator</b><br>Capacity:                | Type:  | <b>Heishin Pump Works Co. Ltd., Model HFM-200<br/>Automatic Oil Discharge</b><br><b>1 x 2.0 m3/h</b>   |
| <b>Sewage Treatment<br/>plant</b>                       | Type:<br>Capacity:                                 | <b>Taiko Kikai Industries Co, Ltd (SBH-25) Activated sludge<br/>aeration (Biological) – USCG certified</b><br><b>1 x 25 persons per day</b>  |
| <b>Hot Water Set<br/>(Calorifier unit)</b>              | No off:  | <b>Harrison Co Ltd (CFT-400C-SE) 400L tank x 2Kw<br/>heater</b>  |
| <b>Steering Gear</b>                                    | Type:<br>Duty Capacity:<br>Hydraulic pump:<br>unit | <b>Electro-Hydraulic system with 2-pump units (dual system) –<br/>(one pump to be able to supply full power)</b><br><b>Max.Torque 270 kn-m</b><br><br><b>Electric motor driven, 2 x 7.5 Kw</b> |

**Bow Thruster :**

**Yes**

**SPEED/CONSUMPTION:** Up to and weather Beaufort scale 4 and max significant wave height of 1.25m (all details are “about” defined as 0.5knot less and +/- 5% on consumption respectively)

**Ballast Condition:**

At Full Speed 14.00 Knots – 14.00 MT/DAY + 1.0 MT MGO

At Eco Speed 12.50 Knots – 10.90 MT/DAY + 1.0 MT MGO

At minimum Speed 11.50 Knots – 8.00 MT/DAY + 1.0 MT MGO

**Laden Condition:**

At Full Speed 14.00 Knots – 15.00 MT/DAY + 1.0 MT MGO

At Eco Speed 12.50 Knots – 11.40 MT/DAY + 1.0 MT MGO

At minimum Speed 11.25 Knots – 8.70 MT/DAY + 1.0 MT MGO

**Port consumption**

Consumption for one generator running (w/boiler running) = MFO 0.45MT/24H / MGO 1.0MT/24H

Consumption (Discharge Operation w/ boiler, ballasting & cargo pump)= MFO 0.45MT/24H / MGO 2.0MT/24H

Extra Consumption at sea and port with Nitrogen compressor running = MFO 0.45MT/24H / MGO 2.5MT/24H

**Notes:**

1. Speed and consumption figures at sea, are best estimated basis daily weather conditions are up to Beaufort scale 4 – max. significant wave height 1.25 m, 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.

**Permanent bunker capacity (100%)**

HFO: **607.68 m<sup>3</sup>**

Diesel: **151.26 m<sup>3</sup>**

Fresh **249.44 m<sup>3</sup>**

Water:

## (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       | 3,769.814     | 3694.417             |                         |                             |
| NO.2 CARGO TANK       | 3,771.536     | 3696.105             |                         |                             |
| T O T A L             | 7541.350      | 7390.522             |                         |                             |
|                       | MARVS (bar g) | Ref. Temp. (deg. C.) | Density at (Ref. Temp.) | Corresponding Quantity (MT) |
| Propane               | 17.70         | 45.0                 | 0.456                   | 3370                        |
| Propylene             | 17.70         | 45.0                 | 0.467                   | 3451                        |
| B/P Mixture (35 / 65) | 17.70         | 45.0                 | 0.487                   | 3599                        |
| I-Butane              | 17.70         | 45.0                 | 0.521                   | 3850                        |
| N-Butane              | 17.70         | 45.0                 | 0.549                   | 4057                        |
| Butylene              | 17.70         | 45.0                 | 0.560                   | 4139                        |
| Butadiene             | 17.70         | 45.0                 | 0.588                   | 4345                        |
| V.C.M.                | 17.70         | 45.0                 | 0.867                   | 4732                        |
| Isoprene              | 17.70         | 45.0                 | 0.654                   | 4731                        |
| Pentane               | 17.70         | 45.0                 | 0.600                   | 4434                        |
| Pentene               | 17.70         | 45.0                 | 0.616                   | 4552                        |
|                       |               |                      |                         |                             |

**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 12.70 bar g, 13.0 kg/cm<sup>2</sup> @ 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):** VCM loaded quantity is limited by vessel's DWT capacity.

### 2. Other transportable products N/A

|     | MARVS | Ref. Temp. (°C.) | Density at Ref. Temp. | Corresponding Quantity (MT) |
|-----|-------|------------------|-----------------------|-----------------------------|
| N/A |       |                  |                       |                             |
| N/A |       |                  |                       |                             |
| N/A |       |                  |                       |                             |

### 3. TANKS

- 3.1 Design pressure (Vapour) – BV-IGC : 17.70 bar g (18.0 kg/cm<sup>2</sup>)  
- USCG: 12.70 bar g (13.0 kg/cm<sup>2</sup>)
- 3.2 Valve setting : 17.70 bar g (18.0 kg/cm<sup>2</sup>) / 12.70 bar g (13.0 kg/cm<sup>2</sup>)
- 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 : 26.6 bar g (27.1 kg/cm<sup>2</sup>)

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

Ex-atmospheric storage with gas return:

- : 1 tank : about 450 m<sup>3</sup> per hour 8" 200A max  
2 tanks : about 900 m<sup>3</sup> per hour 10" 250A max

**\* Remarks :**

- \* *Based on the Velocity of 5.5 m/sec. in the Liquid Piping.*
- \* *In case of a Cargo of minus (-) temperature, it shall be heated up with Shore Cargo Heater. (In case Ship's Cargo Heater is used, see item B-12. of this Form-C.)*
- \* *Loading shall be performed with Shore Pump only.*
- \* *Gas Return Line shall be of proper size (more than 6").*
- \* *Subject to both the vessel's tanks and shore tanks under favorable condition*

**5. CARGO PUMPS**

- 5.1 Type : **Electric motor driven Deepwell pump, vertical centrifugal multistage**  
 Maker : **Wartsila Svanehoj A/S**  
 How many : **1 pump per tank**  
 Maximum specific gravity : **0.949**
- 5.2 Capacity (CMB/Hour) : **450 m<sup>3</sup>/hr at 110 m l.c.(SG 0.657)**  
**300 m<sup>3</sup>/hr at 138 m l.c. (SG 0.949)**  
 Two speed or variable speed : **Single Speed**  
 Rated kW (each) : **180 kW**  
 Working pressure maximum : **17.7 bar g**
- 5.3 Location: **At each cargo tank**  
 Removable : **no**
- 5.4 Booster pumps : **N/A**  
 Type : **N/A**  
 Maker : **N/A**
- 5.5 Capacity (CMB/Hour) : **N/A**  
 Working pressure: **N/A**
- 5.6 Location: **N/A**
- 5.7 Time to discharge a full liquid cargo using all pumps against back pressure at pump  
 1 bar : **about 10 hours for LPG**  
 5 bars : **about 30 hours for LPG**  
 10 bars : **-----**
- 5.8 Nominal back pressure when working : **about 1 bar**  
 In series corresponding head : **N/A**  
 Maximum back pressure : **about 5 bar**  
 Nominal pressure at rail (propane) : **about 13 bar at 20 degree C of cargo temperature**
- 5.9 What amount of cargo remains in tanks after completion pumping before stripping:  
 - liquid: **About 0.5 m<sup>3</sup> per each tank excluding dew on inside tank surface at trim 0**  
 - vapor: **About 21.7 ton(at tank press 0.5356 kg/cm<sup>2</sup>/G and temp 10 deg C**

**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 2.0 hours**

## 7. CARGO COMPRESSORS

7.1 Type : **Vertical single bore, double action, water cooled, oil free**

Make : **MIKUNI JUKOGYO Co Ltd**

How many : **2 sets** Piston displacement **467m<sup>3</sup>/h** Rated Kw **75 kW** Stroke  
**177.8 mm** Max discharge pressure **19.6 bar g** Pressure differential **4 bar**  
**Max 6.8 bar at single action**

No of Revolutions: **540 rpm**

7.2 Are compressors oil free : **Yes**

7.3 Can they reliquefy VCM without risk : **No, only for compression of vapour**

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 : **TBA**

8.2 Can the vessel produce inert gas? : **Yes (N2)**

If so, state type and composition of gas produce: **Nitrogen: 97 % to 99.90%**

**Capacity (discharge) @ 97.00% N2 is 250 Nm3/h**

**Capacity (discharge) @ 98.00% N2 is 240 Nm3/h**

**Capacity (discharge) @ 99.00% N2 is 210 Nm3/h**

**Capacity (discharge) @ 99.50% N2 is 185 Nm3/h**

**Capacity (discharge) @ 99.90% N2 is 130 Nm3/h**

**Oxygen: 1.0 % to 0.10%**

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: YES / Vertical Cylindrical Type (N2)

- Size : 1.5 CBM

- Pressure :9.5 BARG

8.5 State if any shore supply of nitrogen may be required: *Shore Supply of Nitrogen is required in order to reduce Oxygen Contents in cargo tanks less than 0.5% by volume or to save time for inerting.*

- for what purpose : **N/A**

- what quantities : **N/A**

## 9. GAS FREEING

State method used giving all details : METHOD

*Discharge Remaining Cargo in cargo tanks as much as possible.*

*Purge Remaining Cargo in cargo tanks with Inert Gas produced by Nitrogen Generator on board the vessel. After the Atmosphere inside cargo tanks being reached the area well lower than Critical Dilution Line, purge the Atmosphere inside cargo tanks with Open Air by using Portable Fan or Cargo Compressors or Nitrogen Generator (Air mode)*

## 10. CHANGING GRADE

*10. Basically Changing Grade shall be performed with shore facilities. The vessel may assist to reduce contents of last cargo vapor by the following method.*

*Discharge Remaining Cargo in cargo tanks as much as possible.*

*Purge Remaining Cargo in cargo tanks with Inert Gas produced by Nitrogen Generator on board the vessel*

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 :                      | <b>Horizontal Shell and Tube</b> |
| 12.2  | Inside Diameter:            | <b>700 mm</b>                    |
| 12.3  | Overall length              | <b>7500 mm</b>                   |
| 12.4  | Cargo flow rate             | <b>250 m3/h (Propane)</b>        |
| 12.5  | Min Inlet Temp              | <b>-48 °C</b>                    |
| 12.6  | Min Outlet Temp             | <b>0 °C</b>                      |
| 12.7  | Required Sea water Capacity | <b>550 m3/h (Min 18°C)</b>       |
| 12.8  | Design Pressure             | <b>19.6 bar g</b>                |
| 12.9  | Hydrostatic Test Pressure   | <b>29.4 bar g</b>                |
| 12.10 | Tightness Test Pressure     | <b>21.6 bar g</b>                |

12.0 State discharging rate for propane to be brought from atmospheric pressure: **NA**  
Loading rate for Propane – **minus 42 ° C / 0° C: about 250 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 (local & remote reading)**

Location: **At each cargo tank dome**

## 16. SAMPLES

16.1 State how tank atmosphere samples can be taken and where from?

**Cargo Samples for vapour and liquid can be taken from the following positions:**

***Fixed Sampling Connection at Tank Domes (3 different height positions)***

***Through Drain Connection of Cargo Manifold***

***Close Loop Sampling System is equipped***

***Through Pressure gauge tube connection of tank top***

Standard of fitting? : **JIS PT1/2 thread**

16.2 Same question for cargo : **TBA**

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) : 63.10 **m**  
- distance from fwd (FP) : 56.19 **m**  
- height above deck : 1.55 **m for Liquid manifold**  
- distance from ship's rail : 2.28 **m**  
- underside keel to manifold : 9.95 **m**

17.3 Liquid line

- flange-size : **10 in.**  
- type : **ANSI300LB**

Gas line

- flange-size : **6 in.**  
- type : **ANSI300LB**

17.4 What reducers on board? : **23 carbon steel pieces supplied**

**Liquid line (1 each) Total: 13 Pieces**

- 01) 1 pc. ANSI #300-250A \* ANSI # 300-300A 10 x 12 inch
- 02) 1 pc. ANSI #300-250A \* ANSI # 300-200A 10 x 8
- 03) 1 pc. ANSI #300-250A \* ANSI # 300-150A 10 x 6
- 04) 1 pc. ANSI #300-250A \* ANSI # 300-125A 10 x 5
- 05) 1 pc. ANSI #300-250A \* ANSI # 300-100A 10 x 4
- 06) 1 pc. ANSI #300-250A \* ANSI # 300-80A 10 x 3
- 07) 1 pc. ANSI #300-250A \* ANSI # 150-250A 10 x 10
- 08) 1 pc. ANSI #300-250A \* ANSI # 150-200A 10 x 8
- 09) 1 pc. ANSI #300-250A \* ANSI # 150-150A 10 x 6
- 10) 1 pc. ANSI #300-250A \* ANSI # 150-125A 10 x 5
- 11) 1 pc. ANSI #300-250A \* ANSI # 150-100A 10 x 4
- 12) 1 pc. ANSI #300-250A \* ANSI # 300-250A 10 x 10
- 13) 1 pc. ANSI #300-200A \* ANSI # 300-200A 8 x 8

**Vapor line: (1 each) Total 10 Pieces**

- ANSI # 300-150A \* ANSI 300-200A 6 x 8 inch
- ANSI # 300-150A \* ANSI 300-125A 6 x 5
- ANSI # 300-150A \* ANSI 300-100A 6 x 4
- ANSI # 300-150A \* ANSI 300-80A 6 x 3
- ANSI # 300-150A \* ANSI 300-50A 6 x 2.5
- ANSI # 300-150A \* ANSI 150-200A 6 x 8
- ANSI # 300-150A \* ANSI 150-150A 6 x 6
- ANSI # 300-150A \* ANSI 150-125A 6 x 5
- ANSI # 300-150A \* ANSI 150-100A 6 x 4
- ANSI # 300-150A \* ANSI 150-80A 6 x 3

- 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 : Length
- Diameter : Flange-
- size : Type
- Bending radius

- 18.2 Minimum temperature acceptable:
- 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 : **5.0 tons @ 10m/min**
- Working radius : **360**

**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**

**BWTM DETAILS:**

Maker : Hyde Marine Inc. USA

Model : Hyde Guardian HG250

Capacity of ballasting: 250 m3/hr

Capacity of de-ballasting: 250 m3/hr

Filtration degree: 5 micron

Working principle: UVT (e.g. UV) Model No: UV16B