

## VESSEL PARTICULARS (FORM C)

### LPG/C GAS DEFIANCE

(Last updated 28/2/2020)

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

#### (A) VESSEL'S CHARACTERISTICS PREAMBLE

Name : **GAS DEFIANCE**  
Owner : **SPACEGAS INC., MARSHALL ISLANDS**  
Flag : **MARSHALL ISLANDS**  
Build : **KANREI SHIPBUILDING CO. LTD., JAPAN**  
Date on Service : **30 JULY 2008**  
Class : **BUREAU VERITAS (BV)**

GT International : **4,309 TON** Suez: **4,752.03 TON**  
Panama: **15,194.70 m3**

NT International : **1,374 TON** Suez: **3,725.19 TON**  
Panama: **3,680 TON**

Is vessel built according to USCG Regulations: **YES**  
RINA Regulations: **N/A**  
Japanese regulations **JIS**

Has vessel received USCG approval: **YES (FOR FOREIGN VESSEL IN US WATER)**  
RINA approval: **N/A**

#### **HULL**

LOA : **99.90 M**  
LBP : **93.50 M**  
Breadth : **17.60 M**  
Depth : **8.00 M**  
Summer DWT : **5,014.82 TON**  
Summer Draft : **6.15 M**  
IMO : **9359557**

OFFICIAL NR: **3218**

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%)	4.17	5.97	5.07	3,446.13
Butadiene (98%)	4.84	6.18	5.51	4,080.54
VCM (98%)	5.59	6.70	6.15	5,014.82

#### **Propeller immersion:**

At draft 5.97 At m correspond : **108.18%**  
At draft 6.18 At m correspond : **114.55%**  
At draft 6.70 At m correspond : **130.30%**

## COMMUNICATION EQUIPMENT

Call letter	:	<b>V7PF3</b>
Radio Station normally watched	:	<b>GMDSS</b>
Radio MF/HF NBDP	:	<b>FURUNO FELCOM 15</b>
Radio MF/HFTEL/DSC	:	<b>FURUNO FS05070</b>
VHF	:	<b>FURUNO FM-8800D</b>
Satellite Communication	:	<b>VSAT +30-211-1983828</b> <b>FBB 764844414 / 764844415</b>
MOB Phone	:	<b>+61 (0) 413 694 356</b>
Email	:	<b>gasdefiance@stealth.gr</b>

## MACHINERY

Main Engine x 1	Type and make	:	<b>MAKITA CORPORATION 5L35MC</b>
	Service power No.	:	<b>2,925 Kw (3,960 ps) x 203 rpm (90%MCR)</b>
	Of Cylinders	:	<b>5</b>
	Cyl Bore x Stroke	:	<b>350 mm x 1050 mm</b>
	Grade of fuel used	:	<b>HFO having a viscosity of not more than 380cst @ 50°C</b>
Auxiliaries	Type and make		<b>YANMAR (6NY16L-SN)-A.C drip proof, self-vent</b>
	(Electrical)		<b>Lated 360 Kw x 445V x 3 phase x 60 Hz</b>
	(Mechanical)		<b>4 stroke x 400 Kw 1,200 rpm</b>
	Grade of fuel used		<b>Diesel Oil- 6 Cst at 40°C</b>
	No off		<b>2</b>
Emergency Generator	Type		<b>Yanmar diesel (NFD-150K) -8Kw, Ac 105V,</b>
	No off		<b>1Phase, 60 Hz</b>
			<b>1</b>
Bow Thruster	Type:	Power:	<b>340bhp</b>
Boiler	Type		<b>Miura Z Boiler (VWH-600E Fully automatic water tube boiler of forced recalcuating type</b>
	Evaporation		<b>538 Kg/Hr</b>
	Max Design Pressure		<b>0.7 Mpa Saturated</b>
	Feed Water Temp		<b>60°C</b>
	No off		<b>1</b>
Exhaust Economiser	Type		<b>Miura (KF-91F)</b>
	Evaporation		<b>380Kg/Hr @ continous service output of main engine</b>
	No off		<b>1</b>
Air Compressors (Main)	Type / Capacity		<b>Matsubara (MH-108)-Vertical, EMD driven, 2 stage, F.W cooled type / 45.0m3 / Hr</b>
	No off		<b>2</b>
Air Compressors (Emergency)	Type / Capacity		<b>Yanmar (NFC 602)-Horizontal, ENG driven, 2 stage, air cooled type 6.3 m3 /Hr</b>
	No off		<b>1</b>
Fuel Oil Purifier	Type		<b>Mitsubishi SJ20G- Centrifugal</b>
	No off		<b>1</b>
	Capacity		<b>800 Ltrs / Hr at 98°C</b>
Lub Oil Purifier	Type		<b>Mitsubishi SJ10G- Centrifugal</b>
	No off		<b>1</b>
	Capacity		<b>800 Ltrs / Hr at 95°C</b>

Evaporator	Type Capacity	<b>Miura Protec Co., Ltd (WM-10SS)-Waste heat recovery 1 x 10 t/day</b>
Fresh Water Sterilizer	Type Capacity	<b>Uzushio Electric Co., Ltd (USS-1K) Electric Ultra Violet lamp with filter 1 x 1,000 litre/h</b>
Fresh Water Mineraliser	Type / Capacity	<b>1 x 1,000 litre/h / Nippon Controls Co Ltd (RF-1000S)- Vertical Welded stainless steel</b>
Waster Oil Incinerator (IMO MEPC 76 (40))	Type Capacity	<b>Miura Protec Co Ltd (BGW-20N-Horizontal air atomizing type with aux burner Oil @ 24.3 l/h &amp; Solid @ 20 Kg/h</b>
Oily Water Separator	Type Capacity	<b>Taiko Kikai Industries Co, Ltd (USM-10 automatic oil discharge type 1 x 1.0 m3/h</b>
Sewage Treatment plant	Type Capacity	<b>Taiko Kikai Industries Co, Ltd (SBT-25) Activated sludge aeration (Biological)-USCG certified 1 x 25 person per day</b>
Hot Water Set (Calorifier unit)	No off	<b>Harison Co Ltd (CFT-400-E) 400L tank with 2 x 10Kw heater (1 Stby) 1 Set</b>
Steering Gear	Type Duty Capacity Hydraulic pump unit	<b>Electro-Hydraulic system with 2-pumps units (dual system) - (one pump to be able to supply full power) 18.5 t-m Electric motor driven, 2 x 5.5 Kw</b>

#### **SPEED in Ballast / Laden**

Upto Beaufort scale 4 and max significant wave height of 1.25m (all details "about" defined as 0.5knot less and +/-5% consumption respectively)

- |   |                  |
|---|------------------|
| 1.Normal service speed                      | : About 13.0 KTS |
| 2.Eco speed (min RPM Blower will not start) | : About 11.5 KTS |

#### **CONSUMPTION / DAY**

1.NORMAL SERVICE SPEED		Ballast		Laden
Main Engine	HFO	: About 12.0 MT/24hr	/	HFO About 12.5 MT/24hr
Auxiliary Engine	MGO	: About 0.85 MT/24hr	/	MGO About 0.85 MT/24hr
2.ECO SPEED (min RPM Blower will not start)				
Main Engine	HFO	: About 10.5 MT/24hr	/	HFO About 11.5 MT/24hr
Auxiliary Engine	MGO	: About 0.85 MT/24hr	/	MGO About 0.85 MT/24hr
At Sea - with N2 Generator operation		: N/A		
In port - idle/Loading (including Boiler)		: HFO abt 0.7mt/24hr	/	MGO About 0.85 MT/24hr
In port - discharging with 2 cargo pumps		: HFO abt 0.7mt/24hr	/	MGO About 1.5 MT/24hr
Permanent bunker capacity (85%)	15% expansion margin	<b>HFO - ABT 389.37MTS basis SG 0.98</b>		<b>MGO - ABT 85.0MTS basis SG 0.86</b>

#### **Notes:**

- 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.
- 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.

Fresh Water	: 212.38 m³
Sludge Tank Capacity	: 25.98 m³
Bildge Tank Capacity	: 13.10 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	2,509.023	2,458.842		
NO.2 CARGO TANK	2,509.214	2,459.029		
TOTAL	5,018.237	4,917.871		
	SPSV (KG/CM2)	Ref. Temp. (deg.C)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	17.65	45.0	0.459	2,257
Propylene	17.65	45.0	0.470	2,311
Butane/Propane Mixture	17.65	45.0	0.487	2,395
I-Butane	17.65	45.0	0.526	2,586
N-Butane	17.65	45.0	0.548	2,694
Butylene	17.65	45.0	0.565	2,778
Butadiene	17.65	45.0	0.588	2,891
V.C.M.	17.65	45.0	0.872	4,288
Isoprene	17.65	45.0	0.656	3,226
Pentane	17.65	45.0	0.600	2950
Pentene	17.65	45.0	0.611	3004

Note(1): In case of USCG, propylene, propane and B/P mixtures are not to be carried except the vapor 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

	SPSV	Ref. Temp. (deg.C)	Density at (Ref. Temp.)	Corresponding
Raffinate 1				
Raffinate 2				

### 3. TANKS

- 3.1 Design pressure (Vapour) - BV-IGC : 17.65 bar g  
 - USCG : 12.75 bar g
- 3.2 Valve setting : 17.65 bar g (18.0 kg/cm2) / 12.75 bar g (13.0 kg/cm2)
- 3.3 Maximum vacuum obtainable : Atmospheric
- 3.4 Maximum temperature acceptable : 45°C
- 3.5 Minimum temperature acceptable : 0°C
- 3.6 Hydrostatic Test Pressure : 26.48 bar g (27.0 kg/cm2)

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

- Ex-atmospheric storage with gas : 1 tank : about 410 m3 per hour for LPG
- Return : : about 250 m3 per hour for VCM
- 2 tanks : about 730 m3 per hour for LPG
- about 450 m3 per hour for VCM

Remarks: SG AT 0 DEG C

\* Based on maximum velocity of 6.5 meters/sec except VCM, and 4.0- meters/sec for VCM in the liquid piping.

\* If cargo temperature is less than 0°C, shore heater to be used.

\* 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 : Niigata Worthington Co., Ltd  
How many : 1 Set per tank (2Sets)  
Maximum specific gravity : 0.601 (LPG) / 0.948 (VCM)
- 5.2 Capacity (CBM/Hour) : 300 m3/hr at 120 m (SG 0.601)  
250 m3/hr at 128 m (SG 0.948)  
Two speed or variable speed : Single speed  
Rated kW (each) : 120Kw  
Working pressure maximum : 20 Bar g
- 5.3 Location : At each cargo tank  
Removable : Yes
- 5.4 Booster pumps : N/A  
Type :  
Maker :
- 5.5 Capacity (CBM/Hour) : N/A  
Working pressure :
- 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 19.0 hours for LPG  
5 bars : about 53 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 bars  
Nominal pressure at rail (propane) : about 13 bars at 20 deg.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 for LPG

## 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 water cooled 1 stage double acting  
by electric motor, oil free.  
Make : TANABE PNEUMATIC MACHINERY CO. LTD  
How many : 2 Sets  
Piston displacement : 460 M3/HR  
Rated Kw : 75 kw  
Stroke : 177.8 mm  
Max discharge pressure : 20 bar g  
Pressure differential : 4 bars 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 : TBA
- 8.2 Can the vessel produce inert gas ? : Yes (n2)  
If so, state type and composition of gas produce  
Nitrogen: 99% to 99.90% Capacity (discharge) @ 97.00% N2 is 250 Nm3/h  
Capacity (discharge) @ 99.00% N2 is 170 Nm3/h  
Capacity (discharge) @ 99.90% N2 is 150 Nm3/h  
Oxygen: 1.0 % to 0.05%  
Discharge Capacity : TBA
- 8.3 Maximum production obtainable : TBA
- 8.4 NOTE: Above quantities obtained at engine room temperature 45°C 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 : After discharge of liquid cargo in tank, nitrogen to be pumped to the tank through vapor line. Mixed gas inside the tanks to be sent to the flare stack through liquid line, after gas freeing, gas analysis should be done through upper and lower sample points.
- 9.2 State time required including stripping : about 12 hours

## 10. CHANGING GRADE

- 10.1 Butadiene, Propylene and VCM all require shore nitrogen in tanks before loading, replacing either previous cargo, ship inert gas or air according to Charterers.  
In case of Butadiene and VCM, the instruction given by the authorised person of the port should be followed. **Time required: about 48 hours**
- 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 : Horizontal shell & tube (PWHT: 610 °C +/- 25-10 °C, 1Hour)
- 12.2 Inside Diameter : 700 mm
- 12.3 Overall length : 7500 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 barG
- 12.9 Hydrostatic Test pressure : 30 barG (3.0 Mpa g)
- 12.10 Tightness test pressure : 20 barG
- 12.11 State discharging rate for propane to be brought from atmospheric pressure  
Loading rate for Propane - 42 °C / 0°C : about 145 Mt/hr

### 13. CARGO VAPORIZER

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

### 14. REFRIGERATING APPARATUS

14.1 Is it independent of cargo ? : N/A  
If 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 on cargo tank dome

### 16. SAMPLES

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

**GAS SAMPLING IN TANK (VAPOR ZONE) CAN BE DONE BY OPENING THE 1/2 NEEDLE VALVE CONNECTED TO THE PRESSURE GAUGE NOZZLE ON THE TANK DOME.**

Standard of fitting ? : JIS PT 1/2 NEEDLE

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

- bow to manifold (Liquid) : 45.15 M  
- distance from stern (AP) : 50.85 M  
- distance from stern (FP) : 42.65 M  
- bow to mid-point manifold : 45.15 M  
- stern to mid-point manifold : 54.75 M  
- main deck to center of manifold : 1.0 M  
- main deck to top of rail : 0.73 M  
- manifold to ship's rail : 2.50 M  
- cargo manifold to vapour manifold : 1.5 M  
- distance from ship side : 2.50 M

17.3 Liquid line - flange-size : 8 Inch  
- Type : 200A(8B)XANSI300lb  
Vapour line - flange-size : 5 Inch  
- Type : 125A(5B)XANSI300lb

17.4 What reducers on board ?

For liquid line : 1pc 250A(10B) x ANSI300lb  
1pc 150A(6B) x ANSI300lb  
1pc 125A(5B) x ANSI300lb  
1pc 100A(4B) x ANSI300lb  
1pc 80A(3B) x ANSI300lb  
1pc 200A(8B) x ANSI150lb  
1pc 150A(6B) x ANSI150lb  
1pc 100A(4B) x ANSI150lb  
1pc 200A(8B) x JIS20K  
1pc 150A(6B) x JIS20K  
1pc 100A(4B) x JIS20K

For vapour line

- 1pc 100A(4B) x ANSI300lb
- 1pc 80A(3B) x ANSI300lb
- 1pc 50A(2B) x ANSI300lb
- 1pc 150A(6B) x ANSI150lb
- 1pc 125A(5B) x ANSI150lb
- 1pc 80A(3B) x ANSI150lb
- 1pc 50A(2B) x ANSI150lb
- 1pc 125A(5B) x JIS20K
- 1pc 100A(4B) x JIS20K

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

18.2 Minimum temperature acceptable                                        :  
 Maximum pressure acceptable    :

18.3 For what products are hoses suitable                                        :

**19. DERRICKS**

- Hose cranes    : **CARGO HOSE CRANE**
- Where situated    : **NEAR MANIFOLD**
- Lifting capacity    : **SWL 4.0 T**
- Working radius     : **15M**

**20. SPECIAL FACILITIES**

20.1 How many grades can be segregated                                        : **No segregation - only 2 grades can be carried**

20.2 How many cooled :    : **N/A**

20.3 Can vessel sail with slack cargo tanks                                        : **YES**