

December 15, 2017

# GAS FORM- C



## 1. PREAMBLE

<b>Ship's name</b>	GAS ODYSSEY
<b>Owners</b>	Lion Gulf International Co. c/o: BENELUX OVERSEAS Inc
<b>Flag – Registry</b>	Liberia - Monrovia
<b>Builder</b>	STX Offshore & Shipbuilding (S.Korea)
<b>Delivery</b>	29.10.2013
<b>Class</b>	NKK(NIPPON KAIJI KYOKAI) NS (LIQUEFIED GAS CARRIER TYPE 2G)(IWS)(PSCM)
<b>IMO No.</b>	9545211

<b>GT</b> (International)	9,160
<b>NT</b> (International)	2,748
<b>GRT</b> (Suez)	10077.2
<b>NRT</b> (Suez)	7780.68
<b>GRT</b> (Panama)	7734
<b>LWT</b> (MT)	5202.9

<b>Is vessel approved?</b>	
<b>USCG</b>	Yes
<b>IMO</b>	Yes

## 2. HULL

	<b>Metres</b>	<b>Feet</b>
<b>LOA</b>	120.4	395.01
<b>LBP</b>	112.4	368.76
<b>Breadth</b>	19.8	64.96
<b>Depth</b>	11.2	36.74
<b>Air draft</b> (fm Summer LL)	27.7	91,18

	<b>Draft (m)</b>	<b>Corresponding DWT</b>
<b>Tropical</b>	8.983	10,518.0
<b>Summer</b>	8.800	10,127.6
<b>Winter</b>	8.617	9,938.9

<b>TPC fully loaded (MT)</b>	21.3
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**Estimated Mean draft with full bunkers and 98% cargo & full bunkers**

December 15, 2017

# GAS FORM- C



Cargo	Mean draft (m)	DWT	displacement
Ethylene	7.50	7420.0	12623.0
Propane	7.93	8441.0	13644.0
Butane	8.26	9085.0	14288.0
Ammonia	8.43	9425.0	14628.0
VCM	8.79	10089.0	15292.0

## 3. COMMUNICATION EQUIPMENT

International call sign	D5EV8
Radio station	GMDSS
Inmarsat F77	FB77
- Telephone	870-773237222
- Telefax	870-783207106
Inmarsat C	463 714 897
MMSI	636016176
Cell phone	+2 01 221609992
E-Mail	master.gasodyssey@amosconnect.com

## 4. MACHINERY

Main Engine	
Maker/model	STX HEAVY INDUSTRY / 6S35ME-B9.1
MCR	5,180KW at 167RPM
Grade fuel used	HFO 380cSt AT 50°C MGO 3~6cSt AT40°C

Auxiliaries Engines	
Type/Model	Four stroke diesel engine - MAN 6L21/31
Maker	STX Engine Ltd (S.Korea)
Output(KW/RPM)	3 x 1320KW AT 900RPM
Generator	3 x 1,100KW, 900RPM, AC450V, 60HZ, 3PHASE, 8POLES
Grade fuel used	HFO 380cSt AT 50°C MGO 3~6cSt AT40°C

Speed

December 15, 2017

**GAS FORM- C**

<b>Guarantee average loaded/ ballast speed (kt)</b>	15,2
<b>Draft at Guarantee average loaded/ ballast speed (m)</b>	7.9 mtrs.

<b>Consumption</b>		
	<b>Consumption at sea</b>	<b>Consumption at port</b>
<b>Main engine (IFO)</b>	19.5 ton/day	-
<b>Aux. Engines (IFO)</b>	2.4 MT/day	4.6 MT/day
<b>Number of A/E in use</b>	One(1)	Two(2)

<b>MDO Consumption alongside in port</b>	<b>Load/Discharge</b>	7.8/4.6 MT/Day
<b>Inert Gas plant when operating</b>	-	4.6 MT/Day
<b>Boiler consumption (MT/day)</b>	1.32	

<b>Permanent bunkers capacity (Excl. daily service tanks) @ 98%</b>	
<b>HFO (MT )</b>	936.5
<b>MDO (MT )</b>	86.3

**5. CARGO INSTALLATION**

<b>Re-liquefaction plant Type</b>	Cascade Type - 2 Stage System
<b>Minimum temperature can maintain</b>	-104° C

<b>Tank No.</b>	<b>Capacities</b>		<b>n-C4 0.605 @ -5° C</b>	<b>C3 0.582 @ -41.5° C</b>	<b>Ethylene 0.5668 -103.0</b>	<b>NH3 0.682 @ -33.4° C</b>	<b>Butadien e 0.653 @ -5° C</b>
	<b>100% M<sup>3</sup></b>	<b>98% M<sup>3</sup></b>					
<b>1</b>	4,554.086	4,463.004	2,789.82	2,857.75	2528.24	3,038.25	2,995.43
<b>2</b>	4,553.444	4,462.375	2,789.42	2,857.34	2527.96	3,037.81	2,995.00
<b>Total</b>	9,107.530	8,925.379	5,579.24	5,715.09	5056.20	6,076.06	5,990.43

**Carried Products**

1) acetadehyde 2) ammonia anhydrous 4) butadien 5) butane 6) butane-propane mixtures  
 butylenes 7) diethyl ether 8) dimethylamine 9) ethane 10) ethyl chloride 11) ethylene  
 ethylene oxide, propylene oxide mixtures with ethylene oxide (content of no more than 30%  
 by weight) 11) isoprene 12) isopropylamine 13) methyl chloride 14) monoethylamine  
 15) propane 16) propylenepropylene oxide 17) vinyl chloride 18) vinyl ethyl ether.

**Cooling before loading**

*(for fully-refrigerated vessels what quantity of cargo is needed and which is the*

corresponding time to pre-cool the tanks and have them ready to load?)

	MT	Hrs
Ethylene	90	24
Butadiene	90	12
VCM	90	10
Propane	90	16
Butane	90	14

## 6. CARGO TANKS

Type	Type C Tank
Material	5% Ni - Steel
MARVS	IMO – 5.50 Bar
	USCG – 3.95 Bar
Maximum Vacuum	0.30 bar
Minimum pressure	0.30 bar
Minimum temperature acceptable in tanks	+45°C to -104°C
Maximum Specific Gravity	0.972 kg/ltr
Maximum Loading rate – m <sup>3</sup> /hour	900
Number of deck tanks	1

## 7. CARGO PUMPS

Number/Type	2 x Electric driven vertical Deep-well pumps (450 m <sup>3</sup> /h @ 120m mlc)	
Maker	Hamworthy-Svanehoj	
Location	Each tank's dome	
Max permissible specific gravity	972 kg/m <sup>3</sup>	
Cargo remaining onboard in cargo tanks after total completion pumping	0,075m <sup>3</sup> /per Tank in sump	
Cargo remaining onboard in cargo tanks (heel) after completion pumping	Liquid	6 m <sup>3</sup>
	Vapour	Subject to tank condition
Total head when working in series with booster pump	240 mlc	
Booster pumps (number/type)	2 x Electric driven horizontal centrifugal pumps (225 m <sup>3</sup> /h @ 120m mlc)	
Maker	Hamworthy-Svanehoj	

## Stripping

Stripping system	Pressurizing
Time required for all traces of liquid cargo	Subject to tank condition

<b>Loading Rates</b>	
<b>Loading rate</b> (storage tank at atmospheric pressure + vapor return) -BUTANE	545 MT /h
<b>Loading rate</b> (storage tank at atmospheric pressure) – PROPANE*	525 MT /h
<b>Loading rate</b> (storage tank at atmospheric pressure) – AMMONIA *	615 MT /h
<b>Loading rate</b> (storage tank at atmospheric pressure) – BUTADIENE*	580 MT /h
<b>Loading rate</b> (pressurized storage tank with vapour return line) – PROPANE	Subject to cargo temperature and ambient conditions
<b>Loading rate</b> (pressurized storage tank with vapour return line) – AMMONIA	Subject to cargo temperature and ambient conditions

(\*)Note: for pressure or semi-refrigerated vessels using the cargo heater with sea temperature +15° C

<b>Time for discharging full cargo using all pumps against no backpressure</b>		
	With vapour return line (hours)	Without vapour return line (hours)
<b>Discharging rate (atm)</b>	10	10
<b>Discharging rate (1 bar)</b>	12	12
<b>Discharging rate (5 bars)</b>	-	12
<b>Discharging rate (10 bars)</b>	-	20

## 8. CARGO COMPRESSORS

<b>Number/Type</b>	2 x (two stage piston type-Oil free)
<b>Maker/Model</b>	Sulzer Burckhardt 2K-160-2H
<b>Total Swept volume</b>	1200 m <sup>3</sup> / hr
<b>Can re-liquefy VCM</b>	YES

	<b>Ethylene</b>	<b>Propane</b>	<b>Ammonia</b>
<b>Refrigeration Capacity</b>	Abt 1640kW	Abt 1165kW	Abt 1269 kW
<b>Suction pressure</b>	1.6 bar abs	5 bar abs	5 bar abs

## 9. INERT GAS SYSTEM

<b>Does the vessel use inert gas?</b>	YES
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December 15, 2017

# GAS FORM- C



<b>Method</b>	PSA System - pressure swing adsorption
<b>Maker</b>	Cirmac / Kaeser
<b>Fuel used</b>	N/A

<b>Does the vessel produce inert gas?</b>	YES
<b>Type</b>	Nitrogen
<b>Production</b>	750 Nm³/hr @ 99.5 % vol

Composition of inert gas	
<b>Carbon dioxide</b>	N/A
<b>Oxygen max.</b>	Max. 2% - Min. <0,1%
<b>Carbon monoxide max.</b>	N/A
<b>Hydrogen max.</b>	N/A
<b>Nitrogen</b>	99% to 99,9%
<b>Soot</b>	N/A
<b>Suphur oxides max.</b>	N/A
<b>Dewpoint</b>	-50° C

<b>State if any shore supply of liquid nitrogen may be required</b>	
May be required for pumping tanks prior to loading butadiene and ammonia	
<b>What quantity?</b>	N/A

## 10. GAS FREEING

<b>Can this operation be carried out at sea?</b>	YES
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State method incl. all details	
<b>For LPG</b>	Nitrogen by vessel's own plant, aeration by air compressor
<b>For NH<sub>3</sub></b>	Nitrogen by vessel's own plant, ventilation by air compressor

Advise time required and consumption of inert gas if any	
<b>From LPG about</b>	Apx 24 hr
<b>From NH<sub>3</sub></b>	Apx. 24 hr
<b>Is the vessel equipped with inert gas blower?</b>	N/A
<b>Capacity</b>	Dry Air 2475Nm³@-20°DewP
<b>Ventilation fan</b>	Dry Air 2475Nm³@-20°DewP

## 11. CHANGING GRADE

Can this operation be carried out at sea?

YES

State method used and time required for charging from NH<sub>3</sub> to LPG and vice versa, to reach 50 ppm to previous cargo in tanks atmosphere, the tanks being dry and free of moisture (dewpoint plus 10° C)

From NH<sub>3</sub> to LPG

Nitrogen production PSA System

Time required

Abt. 48h

From NH<sub>3</sub> to LPG

Nitrogen production PSA System

Time required

Abt. 48h

Can vessel reduce in tank atmosphere and gas installation concentration of previous cargo below 50 ppm?

YES

Method used, time required and extra shore supply if any

Nitrogen Production, time depending on cargo conditions, shore supply possible

How can it be checked that no liquid gas remain onboard

Check level indicators, open drains at low points

## 12. CARGO HEATER

Cargo Heater

YES

Maker

TGE Marine Engineering GmbH

Type

Shell/tube

Discharging rate for C3 & NH<sub>3</sub> to be brought fm atmospheric pressure to -5° C @ S.W 15° C

**PROPANE**

230 MT/hr

**AMMONIA**

150 MT/hr

State discharging rate for propane with 2.5 mol % ethane to be brought from -44oC to -5oC at sea temperature of 15oC

350 MT/hr

## 13. CARGO VAPORIZER

In case of need of vapor gas during discharge, can vessel produce its own if no shore gas available?

Yes by cargo heater/vaporizer

## 14. REFRIGERATING APPARATUS

It is independent of cargo?

YES

Two(2) grade re-liquefaction systems

**15. MEASURING APPARATUS**

What gauges onboard	Level/pressure/temperature
Location and type	Float type level gauges/P& T sensors
Number of temperature sensors/gauges per tank	10 pcs
Number of pressure sensors/gauges on tank	3 pcs

**16. SAMPLES**

Where samples can be taken?	Five(5) vapours samples inside tank, one closed sampling liquid sample by circulation
Are sample bottles available onboard?	YES

**17. CARGO LINES**

Is vessel fitted with midship manifolds	YES
Number of lines on each side	2 x Liquid (6" & 8") 300A
	2 x Vapour (4" & 6") 300A
Lines Configuration	L-V-V-L
Distance from cargo manifold to bow	57,900mm
Distance from manifold to stern	62,100 mm
Height upper cargo manifold above main deck	3,000 mm
Height above Summer Draft mark	5,400 mm
Height upper cargo manifold waterline when LWT	10,720 mm
Height upper cargo manifold above waterline when in ballast	8,704 mm
Distance manifold from ship's rail	2,100 mm
Distance between liquid lines	4,200 mm
Distance between vapour lines	1,400 mm
Distance between loading and vapour return connections	1,400 mm
Is vessel fitted with stern discharge	N/A
Is vessel fitted with fore discharge	N/A

**Note:** Above distances from center line of liquid and vapour crossovers



Dimension of lines		
	Diameter	Flange size
Liquid (P/S)	6", 8"	ANSI #300
Vapour	4", 6"	ANSI #300
Booster	N/A	N/A

What reducers onboard			
Number	Diameter	Length	Pressure rating
1	12" x 8" - 1	500 mm	(300# x 300#)
2	12" x 6" - 1	500 mm	(300# x 300#)
3	10" x 8" - 1	500 mm	(300# x 300#)
4	10" x 6" - 2	500 mm	(300# x 300#)
5	10" x 8" - 1	500 mm	(150# x 300#)
6	8" x 8" - 2	500 mm	(300# x 300#)
7	8" x 8" - 1	500 mm	(300# x 300#)
8	8" x 6" - 5	500 mm	(300# x 300#)
9	8" x 6" - 1	500 mm	(300# x 150#)
10	8" x 6" - 1	500 mm	(150# x 300#)
11	6" x 6" - 3	500 mm	(300# x 300#)
12	6" x 6" - 1	500 mm	(300# x 150#)
13	6" x 5" - 1	500 mm	(300# x 300#)
14	6" x 4" - 3	500 mm	(300# x 300#)
15	6" x 4" - 1	500 mm	(300# x 150#)
16	6" x 3" - 1	500 mm	(300# x 300#)
17	6" x 3" - 1	500 mm	(300# x 150#)
18	6" x 4" - 1	500 mm	(150# x 300#)
19	4" x 4" - 1	500 mm	(300# x 300#)
20	4" x 4" - 4	500 mm	(300# x 150#)
21	4" x 3" - 1	500 mm	(300# x 300#)
22	4" x 3" - 1	500 mm	(300# x 150#)
23	4" x 4" - 1	500 mm	(150# x 150#)
24	1" x 1" - 2	500 mm	(300# x 150#)
	<b>Spools</b>		
1	3" x 3" - 2	330 mm	(300# x 300#)
2	2" x 2" - 2	330 mm	(300# x 300#)

**18. LIFTING APPLIANCES**

Where situated	Aft stbd.	Amidship
Number and lifting capacity	Provision and engine part handling crane(1.5t SWL)	hose handling crane (4t SWL)

December 15, 2017

# GAS FORM- C



**Max. distance from ship's side of lifting hook**

max 6,000mm

max 15,000mm

## 19. HOSES

For what products are hoses suitable				
Number	Length	Diameter	Working pressure	Flange
Purging hose	6,000mm	4"	12	ANSI #150
Drain hose	6,000mm	1"	35	ANSI #300

## 20. SPECIAL FACILITIES

How many grades can vessel segregate?	
Indicate systems	Two(2) grades - if compatible
Is vessel able to load/discharge two or more grades simultaneously?	YES
Can vessel sail with slack tanks?	YES
Is vessel fitted with purge tank?	NO

"All the above given in good faith and to the best of our knowledge"

"All times indicated in various operations are Owner's best estimates, and cannot be guaranteed, as they will vary under different Operating conditions"