

**GAS FORM C****Main Particulars****2.1 PREAMBLE**

<b>Ship's name</b>	BW LEO
<b>Owners</b>	BW Constellation II Limited
<b>Flag – Registry</b>	Isle of Man (IOM)
<b>Builder</b>	Hyundai Heavy Industries Co., Ltd, Ulsan, Korea
<b>Delivery</b>	27 <sup>th</sup> April 2015
<b>Class</b>	DNV-GL
<b>Class notation</b>	+A1, Tanker for Liquefied Gas, Ship Type 2G(-50C, 0.610kg/m,0.275 bar), E0, NAUTICUS(Newbuilding), PLUS, TMON, BIS, BWM-E(s), BWM-T, COAT-PSPC(B)
<b>IMO No.</b>	9703019

<b>GRT / NRT</b>	
<b>International</b>	47342 / 18644
<b>Suez</b>	50476.37 / 44505.69
<b>Panama</b>	NA

**2.2 HULL**

	<b>Metres</b>
<b>LOA</b>	225.2 mtrs
<b>LBP</b>	220.0 mtrs
<b>Breadth</b>	36.6 mtrs
<b>Depth</b>	22.2mtrs
<b>Keel to highest point</b>	49.73 mtrs (48.02 mtrs when tilted)

<b>Max summer draft</b>	12.022 mtrs	<b>Corresponding deadweight</b>	54561mt
<b>Freeboard summer draft</b>	6.646 mtrs		

<b>TPC fully loaded</b>	70.60 mt
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<b>Mean draft with 95% full bunkers and full cargo</b>		
<b>Specific Gravity</b>	<b>Mean draft</b>	<b>Corresponding DW</b>
0.5800	11.51 m	51494.6
0.6100	11.88 m	53965.9



<b>Communication equipment</b>	
<b>International call sign</b>	2 I E T 2
<b>Radio Station</b>	Isle of Man
<b>Satcom FBB 500</b>	+870 773 929 613
<b>Satcom FBB - Telefax</b>	+870 783 151 567
<b>V-SAT (Bridge/Capt Office)</b>	Line 1: +47 8150 3309 / +65 3158 9850 Line 2: +47 8529 5484 / +65 3158 9835
<b>Satcom C</b>	423 594 247 / 248
<b>Cell phone</b>	Not Available
<b>MMSI</b>	235 109 137
<b>E-mail</b>	<a href="mailto:leo@bwfleet.com">leo@bwfleet.com</a>

### 2.3 MACHINERY

<b>Main Engine</b>	
HYUNDAI-MAN B&W 6G60ME-C9.2	
<b>Max Cont.</b>	12,400 kW (16,622 (HP) PS) x 92.2 RPM
<b>Grade fuel used</b>	IFO 380 cst

<b>Auxiliaries</b>	
<b>Diesel</b>	3 units
<b>Make</b>	HYUNDAI HIMSEN 6H21/32
<b>kW/RPM</b>	1200 kW / 900 rpm
<b>Grade fuel used</b>	700 cSt at 50°C (ISO 8217)

<b>Speed/Consumption*</b>	
Guaranteed average loaded/ballast speed over 12 months	
Average consumption on Main Engine guaranteed speed	
Average consumption on auxiliaries	

\*) Above based on 50/50 propane/butane and max force 5 Beaufort

<b>Slow speed/consumption figures as guidance only</b>	
Average loaded/ballast	Consumption
13 Knots	
14 Knots	
15 Knots	

<b>Average consumption in port</b>	
<b>Inert gas plant when operating</b>	
<b>Boiler consumption</b>	

<b>Permanent bunkers capacity (95% full) (Excl. daily service and settling tanks)</b>		
<b>HFO</b>	2112.0 m3	2090.9 mt
<b>LSFO</b>	150.0 m3	148.5 mt
<b>GAS OIL</b>	270.1 m3	229.6 mt
<b>MDO</b>	NA	NA

### 2.4 CARGO INSTALLATION

REVISION	DATE	PREPARED BY	APPROVED BY	CHAPTER	PAGE NO
00	02/10/2014	-	-	02	2.2



Transportable products and respective quantities								
Tank No.	100 % m <sup>3</sup>	98 % m <sup>3</sup>	Butane 0.6012 -0.0°C Mt	Propane 0.5813 -42.0°C mt	NH <sub>3</sub> 0.680 -32°C MT	Butadiene 0.651 -5.0°C MT	Propylene 0.6094 -48.0°C MT	Naphtha 0.676 30°C MT
1	10837.7	17676.9	10620.5	10255.1	NA	11498.8	10748.9	NA
2	22583.5	22131.8	13297.1	12839.7	NA	14396.3	13457.7	NA
3	22592.2	22140.3	13302.2	12844.6	NA	14401.8	13462.9	NA
4	20981.7	20562.0	12354.0	11928.9	NA	13375.1	12503.2	NA
<b>Total</b>	84195.1	82511.0	49573.8	47868.3	NA	53672.0	50172.7	NA
<b>Deck tank capacity</b>					NA			
Transportable products and respective quantities								
<i>Other transportable products: Pure Propane, Commercial Propane, Commercial Butane, Mixture of Propane and Butane in any proportion, Propylene</i>								

Scantlings of the cargo tanks are based on a maximum density of cargo of 610kg/m <sup>3</sup> . Cargo with density up to 1,000 kg/m <sup>3</sup> may be carried in the cargo tanks on the following conditions:	
For density of 1,000 kg/m <sup>3</sup>	N/A
For densities between 610 and 1,000 kg/m <sup>3</sup>	Inversely linear proportional to cargo density 98% filling at S.G=0.61 to 67 % filling at S.G=1.0

Tank working pressure	
Maximum pressure	0.400 barg (harbour) / 0.275 barg (sea)
Minimum pressure	-0.05 bar
Minimum temperature acceptable in tanks	-50°C

Loading rate - tons/hour	2700 mt on two manifolds with vapour return
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## 2.5 CARGO PUMPS

Number and type	8 x 600 m3/hr / Wartsila Svanehoj
Location	2 x pumps in each cargo tank
Max permissible specific gravity	120 mLC, 0.610 kg/m3
Time for discharging full cargo using all pumps against no backpressure	19 hrs (excluding stripping)
Cargo remaining onboard in cargo tanks after completion pumping	Total approx.. 115 m3 unpumpable liquid (all cargo tanks)
Total head when working in series with booster pump	350 mLC (1 DWP + 2 BP)
Booster pumps	2 x 600 m3/hr at 115 mLC / Wartsila Svanehoj, 0.610 kg/m3

**2.6 CARGO COMPRESSORS**

<b>Number and type</b>	2 x Burckhardt Compression / 4K165-3P_1	
	<b>Propane</b>	<b>Ammonia</b>
<b>Refrigeration Capacity</b>	2 x 660 KW (710 rpm, F-LSC, 5% Ethane)	N/A
<b>Suction pressure</b>	1.4 bar (A)	N/A
<b>Condensate Temp.</b>	28°C	

**2.7 INERT GAS SYSTEM**

<b>Does the vessel use inert gas?</b>	Yes
<b>Utilization</b>	Inerting of Void spaces and Cargo tanks as required

<b>Does the vessel produce inert gas?</b>	Yes
<b>Type</b>	Wartsila Moss AS
<b>Daily production</b>	NA

<b>Composition of inert gas</b>	
<b>Carbon dioxide</b>	14 %
<b>Oxygen max.</b>	1.0 %
<b>Carbon monoxide max.</b>	100 ppm by volume
<b>Hydrogen max.</b>	-
<b>Nitrogen</b>	Balance
<b>Soot</b>	0 on Bacharach scale
<b>Sulphur oxides max.</b>	1 ppm by volume
<b>Dew point</b>	-40.0 °C at 760 mmHG

<b>State if any shore supply of liquid nitrogen may be required</b>	No
<b>What quantity?</b>	NA

**2.8 GAS FREEING**

<b>Can this operation be carried out at sea?</b>	Yes
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<b>State method incl. all details</b>	
<b>For LPG</b>	<b>Boil Off</b> 36 hrs C3/C4
	<b>Inerting</b> 35 hrs
	<b>Ventilating for Entry</b> 11 hrs (Deck fan)
<b>For NH<sub>3</sub></b>	N/A

<b>Advise time required and consumption of inert gas if any</b>	
<b>From LPG approximately</b>	35 hrs / 175000 m3
<b>From NH<sub>3</sub> approximately</b>	N/A

<b>Is the vessel equipped with inert gas blower?</b>	Yes
<b>Capacity</b>	5300Nm <sup>3</sup> /hr at 0.4 barg

<b>Ventilation fan</b>	2 x 10000 m <sup>3</sup> /hr at 1475 mmWC
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**2.9 CHANGING GRADE**

Can this operation be carried out at sea?	N/A
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State method used and time required for changing from NH<sub>3</sub> to LPG and vice versa, to reach 50 ppm of previous cargo in tanks atmosphere, the tanks being dry and free of moisture (dewpoint plus 10 degrees C)

From NH <sub>3</sub> to LPG	NA
Time required	NA

From LPG to NH <sub>3</sub>	NA
Time required	NA

Can vessel reduce in tank atmosphere and gas installation concentration of previous cargo below 50 ppm?	NA
Method used, time required and extra shore supply if any	NA
How can it be checked that no liquid gas remain onboard	Temperature indication & Pressure Rise

**2.10 CARGO HEATER**

State discharging rate for propane with 2.5 mol % ethane to be brought from -42 °C to 0 °C at sea temperature of 15 °C	325 mt/hr
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**2.11 CARGO VAPORIZER**

In case of need of vapour gas during discharge, can vessel produce its own if no shore gas available?	Yes
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**2.12 REFRIGERATING APPARATUS**

Is it independent of cargo?	No
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**2.13 MEASURING APPARATUS**

What gauges onboard	Radar
Location and type	2 for each cargo tank Kongsberg / GLA-100/5
Number of temperature sensors/gauges pr tank	7 – (3 each side of tank and 1 in vapour dome)
Number of pressure sensors/gauges pr tank	1 in each tank



2.14 SAMPLES

Where can samples be taken?	1) Cargo tank dome using cargo pump (liquid) 2) Manifold (liquid) 3) Cargo tank dome (vapour)
Are sample bottles available onboard?	Not available at this time

2.15 CARGO LINES

(See also last page of this gas form C)

Is vessel fitted with midship manifolds	Yes
Distance from cargo manifold to bow	111.41 mtrs
Distance from manifold to stern	113.75 mtrs
Height cargo manifold above main deck	2.110 mtrs
Height cargo manifold above waterline when in ballast	17.41 mtrs
Height cargo manifold above waterline when loaded	12.29 mtrs*
Distance from shipside to manifold flange	4.250 mtrs
Distance between loading and vapour return connections	2.250 mtrs
Windage area in normal ballast condition	4166.0m2
Is vessel fitted with SPM chainstopper suitable for 76 mm chain.	Yes
Is vessel fitted with cruziform bollards/fairleads/eye-pads in manifold area	Yes

\*Summer Draught.

Dimension of lines		
	Diameter	Flange size
Liquid	350 mm / 14 inch (Manifold)	14"
Gas Line	250 mm / 10 inch (Manifold)	10"
Booster Line	350 mm / 14 inch* (Manifold)	14"(*No separate booster manifold, liquid manifolds used to unload cargo using booster)

What reducers onboard			
Number	Diameter	Length	Pressure rating
2	14" x 16"	62.5 cm	(ANSI) 300 x 150
2	14" x 14"	50.0 cm	(ANSI) 300 x 150
2	14" x 12"	58.7 cm	(ANSI) 300 x 150
2	14" x 10"	57.5 cm	(ANSI) 300 x 150
2	14" x 8"	57.5 cm	(ANSI) 300 x 150
2	14" x 16"	64.4 cm	(ANSI) 300 x 300
2	14" x 12"	60.3 cm	(ANSI) 300 x 300
2	14" x 10"	59.0 cm	(ANSI) 300 x 300
2	14" x 8"	58.4 cm	(ANSI) 300 x 300
2	10" x 12"	55.0 cm	(ANSI) 150 x 150
2	10" x 8"	50.0 cm	(ANSI) 150 x 150
2	10" x 6"	50.0 cm	(ANSI) 150 x 150

2.16 LIFTING DEVICE

Where situated	Aft	Amidship
Number and type	2, Electro Hydraulic	1, Electro Hydraulic
Lifting capacity	4 tons	10 tons
Max. distance from ship's side of lifting hook	Port 9.2 mtrs Stb. 11.2 mtrs	6.7 mtrs

**2.17 HOSES**

<b>For what products are hoses suitable</b>	No Cargo Hoses Carried on-board
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<b>Number</b>	<b>Length</b>	<b>Diameter</b>	<b>Working pressure</b>	<b>Flange</b>
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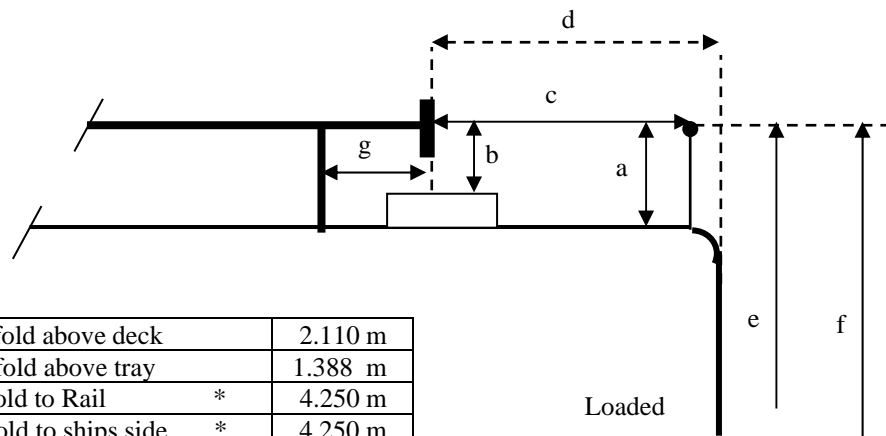
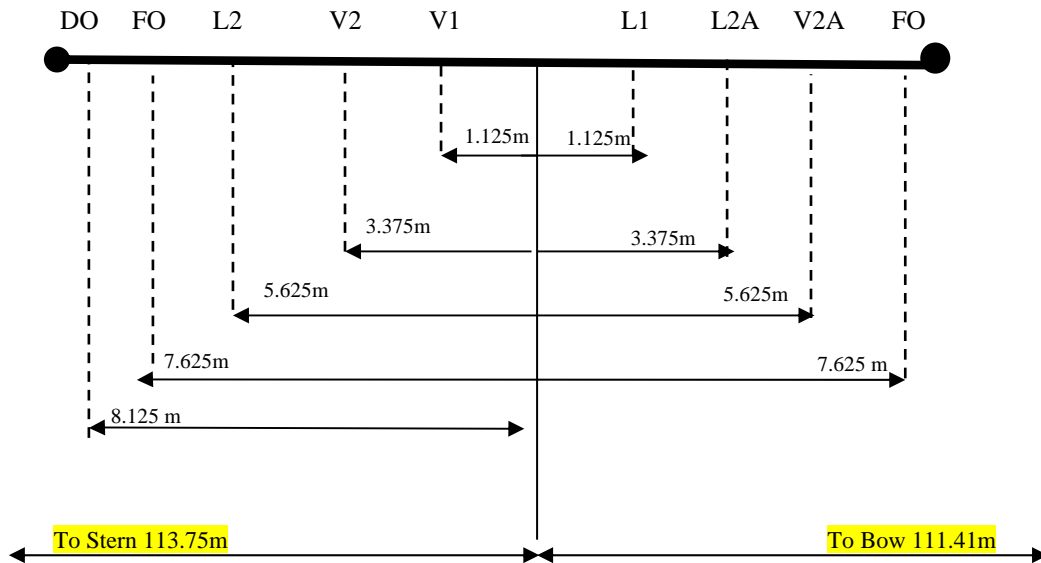
**2.18 SPECIAL FACILITIES**

<b>How many grades can vessel segregate?</b>	2
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<b>Indicate systems</b>	(Tks 1+3) and (Tks 2+4) or (Tks 1+3+4) and (Tk 2)
<b>Is vessel able to load/discharge two or more grades simultaneously?</b>	Yes
<b>Can vessel sail with slack tanks?</b>	Yes
<b>Is vessel fitted with purge tank?</b>	No



**ARRANGEMENT OF CARGO MANIFOLD**



a) Height of manifold above deck	2.110 m
b) Height of manifold above tray	1.388 m
c) Distance manifold to Rail *	4.250 m
d) Distance manifold to ships side *	4.250 m
e) Dist. waterline loaded to manifold	12.29m
f) Dist. waterline ballast to manifold	17.41m
g) Dist. 1 <sup>st</sup> stander to manifold	0.39 m

\* without reducer

**PARALLEL BODY LENGTH**

**LOADED CONDITION**

