GAS FORM C

Main particulars

2.1 PREAMBLE

Ship's name	BW LIBERTY
Owners	BW Liberty Limited
Flag – Registry	Norway (NIS) - Oslo
Builder	Daewoo Shipbuilding & Marine Engineering Co. Ltd., Okpo, South Korea
Delivery	30th November 2007
Class	Lloyd's Register
Class notation	+100A1, Liquefied Gas Carrier, Ship Type 2G, Butane, Propane, Anhydrous ammonia, in Independent Tanks Type A Maximum SG 0.69, Maximum Vapour Pressure 0.25 bar at sea(0.45 bar in harbour, Minimum Temperature -50° C, *IWS, LMC, IGS,UMS, NAV1, RMC(LG), ShipRight(LG), LI
IMO No.	9350288

GRT / NRT	
International	48,456 / 17,304
Suez	51,346.2 / 46,001.57
Panama	N/A

2.2 HULL

	Metres
LOA	226.00 mtrs
LBP	215.00 mtrs
Breadth	36.61 mtrs
Depth	22.20 mtrs
Keel to highest point	54.765 mtrs
KTM (lowered antenna)	52.365 mtrs

Max summer draft	11.822 mtrs	**Corresponding deadweight**	54,975 mt

TPC fully loaded	70.87 mt

Mean draft with 95% full bunkers and full cargo		
Specific Gravity	**Mean draft**	**Corresponding DW**
0.581 (C3 – 98%)	11.462 m	52,431
0.596 (C4 – 98%)	11.697 m	54,089
0.680 (NH3 – 87%))	11.822 m	54,975
0.703	N/A	N/A

Communication equipment	
International call sign	LAMM7
Radio station	GMDSS
Satcom F-77	
- Telephone	+870 765 065 045 / 46
- Telefax	765 065 047 / 48
V Sat	
- Telephone	+47 85 23 07 03 / +65 31 58 09 71
Satcom C	+870 425 907 110
Cell phone	+47 97 56 69 28
MMSI	259 071 000
E-mail	liberty@bwfleet.com

2.3 MACHINERY

Main Engine	
STX - MAN B & W 6S60 MC - C	
Service power (90% MCR)	12,200 kW at 101.4 RPM
Grade fuel used	HFO up to 600 cSt at 50C

Auxiliaries	
Diesel	3 units
Make	Yanmar 8N21AL-GV
kW/RPM (100%)	1,270 kW / 900 rpm
Grade fuel used	HFO up to 600 cSt at 50C / MDO grade ISO-F-DMB-DMA

Speed/Consumption*	
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

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

Average consumption in port	
Inert gas plant when operating	
Boiler consumption	

Permanent bunkers capacity (98% full) (Incl. daily service and settling tanks)		
HFO		3,390 mt
Diesel Oil		145 mt
Light Diesel Oil		95 mt

2.4 CARGO INSTALLATION

Transportable products and respective quantities								
Tank No.	**100 % m^3**	**98 % m^3**	**n-Butane 0.602 -0.08°C mt**	**Propane 0.579 -42.12°C mt**	**Ammonia 0.682 -33.6°C mt**			
1	18,412.55	18,044.30	10,737	10,362	10,816			
2	22,360.33	21,913.12	13,040	12,584	13,135			
3	22,349.96	21,902.96	13,034	12,578	13,129			
4	21,474.40	21,044.91	12,523	12,085	12,615			
Total	84,597.24	82,905.29	49,334	47,609	49,695			
Deck tank capacity					N/A			
Transportable products and respective quantities								
Other transportable products: ***Propane with max 5 mole % Ethane in liquid phase / Mixture of Propane and Butane in any proportion***								

Scantlings of the cargo tanks are based on a maximum density of cargo of 610 *kg/m³*. Cargo with density up to 1,000 kg/m³ may be carried in the cargo tanks on the following conditions:	
For density of *1,000 kg/m³*	N/A
For densities between *610* and *1,000 kg/m³*	87% by volume for cargo density of 690 kg/m3

Tank working pressure	
Maximum pressure	0.450 barg (harbour) / 0.250 barg (sea)
Minimum pressure	-0.050 bar
Minimum temperature acceptable in tanks	-50 °C

Loading rate - tons/hour	2,500 mt on two manifolds

2.5 CARGO PUMPS

Number and type	8 x 600 m3/hr Hamworthy Svanehoj Centrifugal Deepwell pumps
Location	2 x pumps in each cargo tank
Max permissible specific gravity	120 mLC, 690 kg/m3
Time for discharging full cargo using all pumps against no backpressure	20 hrs
Cargo remaining onboard in cargo tanks after completion pumping	Total appr 60 m3 unpumpable liquid (all cargo tanks)
Total head when working in series with booster pump	235 mLC
Booster pumps	2 x 600 m3/h Hamworthy Svanehoj Centrifugal, 115 mLC, 690 kg/m3

2.6 CARGO COMPRESSORS

Number and type	4 x Sulzer Burckhardt piston Compressor 3K 140-3A

	Propane	**n-Butane**	**Ammonia**
Refrigeration Capacity	242 kW (5.0% Ethane)	345 kW	398 kW
Suction pressure	0.200 bar		

2.7 INERT GAS SYSTEM

Does the vessel use inert gas?	Yes
Utilization	Inerting of Void spaces and Cargo tanks

Does the vessel produce inert gas?	Yes
Type	Hamworthy Moss Inert Gas Generator
Daily production	120,000 m³

Composition of inert gas	
Carbon dioxide	14.0 %
Oxygen max.	1.0 %
Carbon monoxide max.	100 ppm by volume
Hydrogen max.	Nil
Nitrogen	Balance (84.9) %
Soot	Bacharach 0
Sulphur oxides max.	1 ppm by volume
Dew point	-45 ^{o}C at 760 mmHG

State if any shore supply of liquid nitrogen may be required	No
What quantity?	N/A

2.8 GAS FREEING

Can this operation be carried out at sea?	Yes

State method incl. all details		
For LPG	**Boil Off**	18/24 hrs C3/C4
	Inerting	30 hrs
	Ventilating for Entry	30 hrs (IG blower)
For NH_3		8 days down to 50 ppm

Advise time required and consumption of inert gas if any	
From LPG approximately	30 hrs / 150,000 m3
From NH_3 approximately	N/A (venting with air)

Is the vessel equipped with inert gas blower?	Yes
Capacity	5,000 m3/hr

Ventilation fan	N/A (Inert gas blower to be used)

2.9 CHANGING GRADE

Can this operation be carried out at sea?	Yes

State method used and time required for changing from NH3 to LPG and vice versa, to reach 50 ppm of previous cargo in tanks atmosphere, the tanks being dry and free of moisture (dewpoint +10 degrees C)

From NH_3 to LPG	Boil off, Heating up, Venting with air and Inerting
Time required	About 9.5 days

From LPG to NH_3	Boil off, Heating up, Inerting and Venting with air
Time required	About 4.5 days

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	Boil off / heating / inerting / venting
How can it be checked that no liquid gas remain onboard	Level Gauge / Temperature sensors

2.10 CARGO HEATER

State discharging rate for propane with 2.5 mol % ethane to be brought from -42 ^{o}C to 0 ^{o}C at sea temperature of 15 ^{o}C	600 m3/hr

2.11 CARGO VAPORIZER

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

2.12 REFRIGERATING APPARATUS

Is it independent of cargo?	Yes

2.13 MEASURING APPARATUS

What gauges onboard	Level gauges
Location and type	2 for each cargo tank / Radar type
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?	Vapour on dome / Liquid on dome using cargo pump and manifold
Are sample bottles available onboard?	No

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	114.21 mtrs
Distance from manifold to stern	111.79 mtrs
Height cargo manifold above main deck	1.564 mtrs
Height cargo manifold above waterline when in ballast	16.300 mtrs
Height cargo manifold above waterline when loaded	11.970 mtrs
Distance from shipside to manifold flange	3.000 mtrs
Distance between loading and vapour return connections	2.50 mtrs
Windage area in normal ballast condition	4,080.6 m2
Is vessel fitted with SPM chainstopper suitable for 76 mm chain.	Yes
Is vessel fitted with cruciform bollards/fairleads/eye-pads in manifold area	Yes

Dimension of lines		
	Diameter	**Flange size**
Liquid System 1	400 mm / 16 inch	ANSI 300
Liquid System 2	400 mm / 16 inch	ANSI 300
Gas Line	250 mm / 10 inch	ANSI 150
Booster Line	350 mm / 14 inch	ANSI 300

What reducers onboard			
Number	**Diameter**	**Length**	**Pressure rating**
2	16” - 16”	50 cm	ANSI 300 - ANSI 300
2	16” - 12”	50 cm	ANSI 300 - ANSI 300
2	16” - 10”	50 cm	ANSI 300 - ANSI 300
2	16” - 8”	50 cm	ANSI 300 - ANSI 300
2	16” - 16”	50 cm	ANSI 300 - ANSI 150
2	16” - 14”	50 cm	ANSI 300 – ANSI 150
2	16” - 12”	50 cm	ANSI 300 – ANSI 150
2	16” - 10”	50 cm	ANSI 300 – ANSI 150
2	16” - 8”	50 cm	ANSI 300 – ANSI 150
2	10” - 12”	50 cm	ANSI 150 – ANSI 150
2	10” – 10”	50 cm	ANSI 150 – ANSI 150
2	10” - 8”	50 cm	ANSI 150 – ANSI 150
2	10” - 6”	50 cm	ANSI 150 – ANSI 150

2.16 LIFTING DEVICE

Where situated	**Aft**	**Amidship**
Number and type	2	1
Lifting capacity	4 tons	5 tons
Max. distance from ship's side of lifting hook	Port 4.0 mtrs Stb. 4.0 mtrs	8.5 mtrs

2.17 HOSES

For what products are hoses suitable	N/A

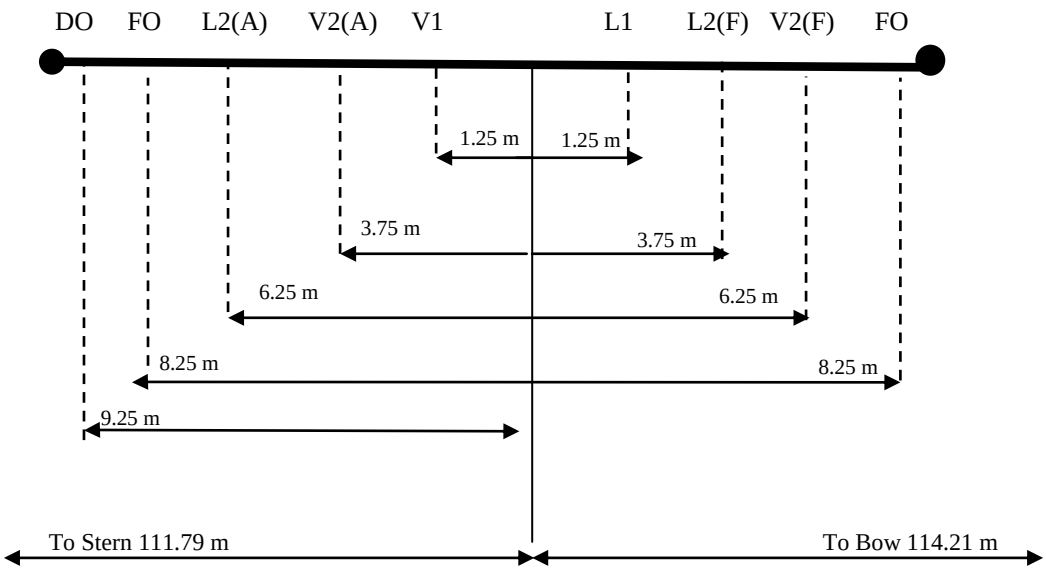
Number	Length	Diameter	Working pressure	Flange
0	N/A	N/A	N/A	N/A

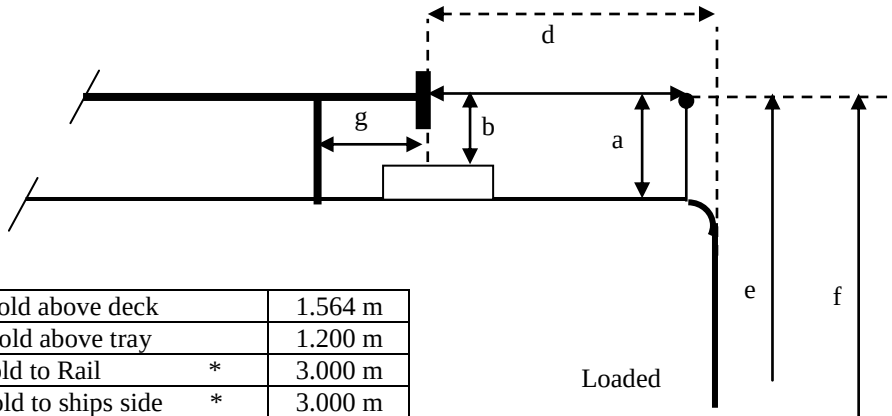
2.18 SPECIAL FACILITIES

How many grades can vessel segregate?	2

Indicate systems	(Tks 1+3) and (Tks 2+4) or (Tks 1+3+4) and (Tk 2)
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

ARRANGEMENT OF CARGO MANIFOLD



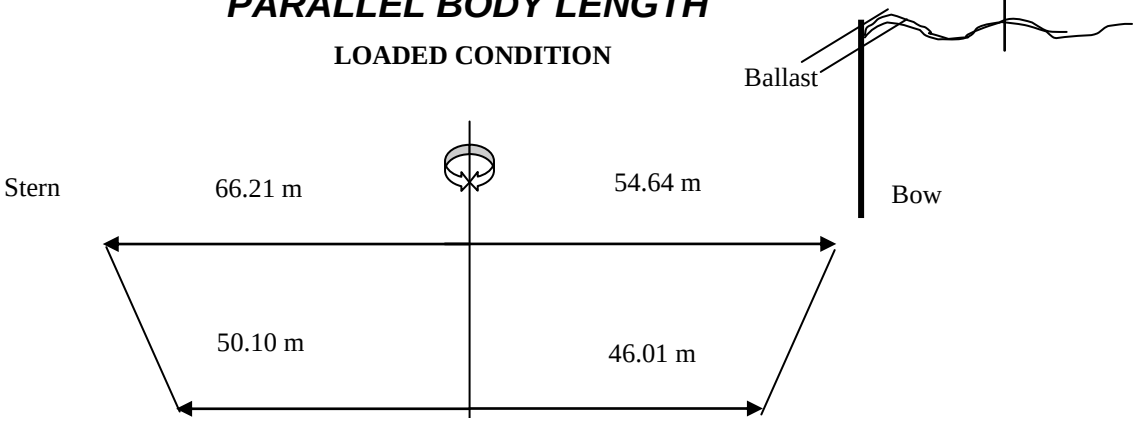


a) Height of manifold above deck		1.564 m
b) Height of manifold above tray		1.200 m
c) Distance manifold to Rail	*	3.000 m
d) Distance manifold to ships side	*	3.000 m
e) Dist. waterline loaded to manifold		11.970 m
f) Dist. waterline ballast to manifold		16.300 m
g) Dist. 1st stander to manifold		0.54 m

* without reducer

PARALLEL BODY LENGTH

LOADED CONDITION



BALLASTED CONDITION