



FORM C GAS

PGC TAORMINA



MODEL

Form C gas

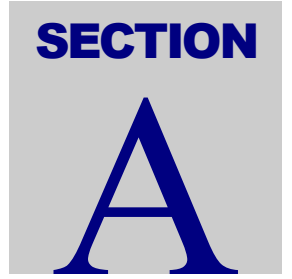
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GENERAL INFORMATION

A1 PRINCIPAL SHIP PARTICULARS

1.1	Name of Ship	PGC TAORMINA	
1.2	Previous Name(s)		
1.3	Builder	Kyokuyo Shipyard, Japan	
1.4	Date of delivery	6 th OCTOBER 2017	
1.5	Classification Society	NK	
1.6	Gross Registered Tonnage	7,211	
1.7	Net registered Tonnage	2,164	
1.8	Suez Tonnage Gross/Net		
1.9	Panama ton. Total Volume m3/Net		
1.10	Registered Owner	TAORMINA MARITIME LTD	
	Address	Ajeltake Road, Ajeltake Island Majuro, Marshall Islands	
	Telephone	+302106912010	
	Telex/fax	+302106212272	
1.11	Manager or Operator	Paradise Navigation SA	
	Address	4-6 Solomou Str. N. Psychiko Greece	
	Telephone	+30 210 6912010	
	Telex/fax	+30 2106912272	
1.12	Flag	Maltese	
1.13	Port of registry	Valletta	
1.14	Official No.	9800166	
1.15	Call Sign	9HA4631	
1.16	Inmarsat No.		
1.17	LR/IMO No.	9800166	
1.18	Was the ship built in accordance with the following regulations		
	IMO	YES	
	USCG	YES	
1.19	IMO Certification		
	Certificate of Fitness IGC	YES	
	Letter of Compliance	YES	
1.20	Date questionnaire compiled		

A2 HULL DIMENSIONS

2.1	Length overall	117.03 m
2.2	Length between perpendiculars	110.00 m
2.3	Extreme breadth	19.20 m
2.4	Extreme depth	9.50 m
2.5	Summer draught	6.80 m
2.6	Corresponding deadweight	abt. 6,600 Tonnes
2.7	Load displacement	
2.8	Load displacement (summer)	10,830.26 Tonnes
2.9	Cargo tank cubic capacity (100%)	abt. 7,031 cbm
2.10	Distance from keel to top antenna	36.64 m
2.11	Air draught (with normal ballast)	32.14 m (Ballast arrival condition)

A3 BALLAST PARTICULARS

3.1	Permanent Ballast	N/A
3.2	Ballast quantity	1,456.8 Tonnes
3.3	Bunkers, stores, etc.	499.9 Tonnes
3.4	Draught - Forward	3.329 m
	- Aft	5.399 m
	- Mean	4.364 m

A4 IMMERSION

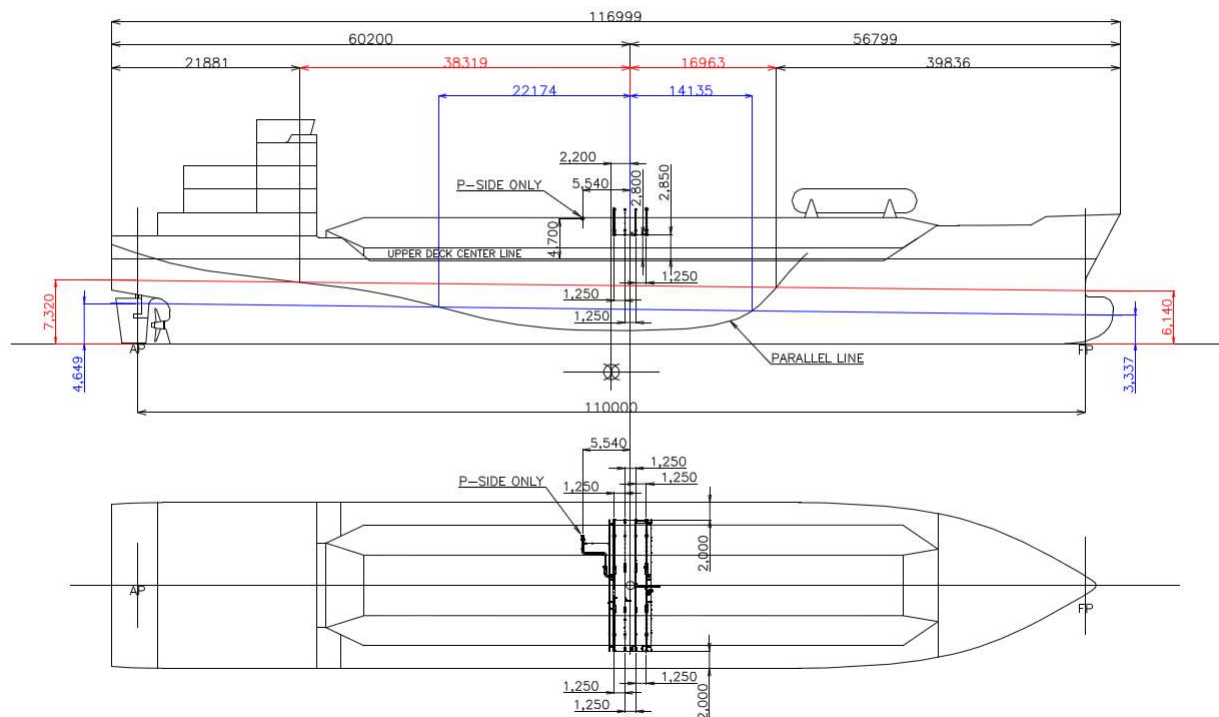
4.1	TPC at normal draught	18.68 Tonnes at 5.80 m mean moulded draught
4.2	TPC at loaded draught	19.66 Tonnes at 6.80 m mean moulded draught

A5 LOADED PARTICULARS

5.1	Cargo	N-Butane (0°C)	Propane (-42°C)	C4 (Butylene) (-7°C)	VCM (-14°C)
5.2	Density	0.602	0.578	0.624	0.973
5.3	Cargo tons	4,176.9 (98%)	4,010.4 (98%)	4,329.6 (98%)	5,536.1 (98%)
5.4	Bunkers IFO	431.8	431.8	431.8	431.8
5.5	GASOIL	-	-	-	-
5.6	Fresh water	214.9	214.9	214.9	214.9
5.7	Stores/spares	-	-	-	-
5.8	Lub oil	-	-	-	-
5.9	Ballast	108.6	108.6	108.6	371.3
5.10	Deadweight	5,077.4	4,911.8	5,230.1	6,700.3
5.11	Draught - Forward	4.795	4.659	4.924	6.183
	- Aft	6.920	6.877	6.960	7.310
	- Mean	5.858	5.768	5.942	6.747

A6 PARALLEL MID-BODY DIMENSIONS

S532 "PGC TAORMINA" PARALLEL BODY LINE



A7 BUNKER CAPACITIES

7.1	M.E. Fuel Oil	Grade	IFO 380	(δ : 0,980)
		Capacity 98%	496.41 Tonnes	
7.2	Diesel Oil	Grade	(δ : 0,840)	
		Capacity 98%	77.18 Tonnes	

A8 FUEL CONSUMPTION DETAILS

8.1	At sea (laden normal service speed)	FO	10.4+5% ton/day
		GO	ton/day for Beaufort >4
8.2	At sea (normal service speed) while conditioning cargo	FO	ton/day
8.3	In port, loading	FO	ton/day
		GO	ton/day
8.4	In port, discharging	FO	ton/day
		GO	ton/day
8.5	In port, idle	FO	ton/day

GENERAL INFORMATION

	GO	ton/day
--	----	---------

A9 MAIN ENGINE PARTICULARS

9.1	Main engine make and type	Makita Corporation / MAN B&W 6L35MC6.1 (De-rated)
9.2	No. of units	1
9.3	Maximum continuous rating (MCR) per engine	178.0 rpm
9.4	Total available power	2,640 kW
9.5	Normal service power (ECR)	2,376 kW at 171.9 rpm

A10 AUXILIARY PLANT

10.1	Make and type of auxiliary generators	Taiyo Electric Co., Ltd. FE 547B-8
10.2	No. of units	3
10.3	Maximum generator output per unit	680 kW
10.4	Shaft generator	N/A
10.5	Emergency generator	129 kW
10.6	Total available power	2,040 kW

A11 POWER/SPEED INFORMATION

11.1	Trial data	BHP	
		MCR	
		Speed	
		Draught	
11.2	Normal service speed	BHP	2,376 kW
		MCR	
		Speed	Abt. 14.1 knots
		Draught	5.814 m

A12 THRUSTERS

12.1	Make and type	KAWASAKI HEAVY INDUSTRIES, LTD. / KT-43B1
12.2	No. Installed	1
12.3	Location and rated bollard pull	FORE (Fr. 147) – 5 Ton Nominal Thrust

A13 FRESH WATER

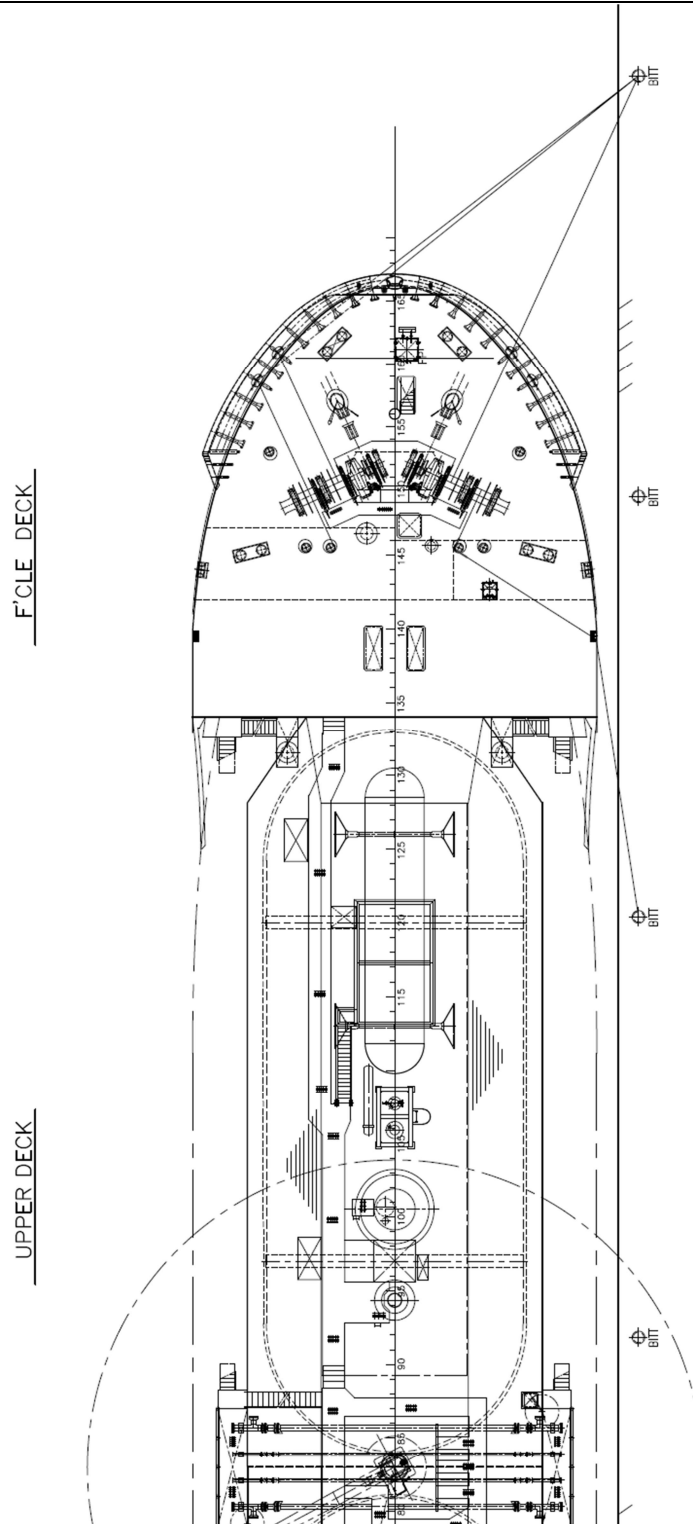
13.1	Capacity of distilled tanks	104.53 m ³
13.2	Capacity of domestic tanks	111.04 m ³
13.3	Daily consumption distilled domestic	
13.4	Daily evaporator production	Abt. 10 tonnes/day

A14 BALLAST CAPACITIES AND PUMPS

Fill the following table		
	Tank	Capacity CBM CBM
14.1	Fore peak	164.30
14.2	Wing or side tanks	3,341.56
14.3	Double bottoms	
14.4	Aft peak	286.36
14.5	Other	
14.6	Total	3,792.22
14.7	Ballast pump make and type	Centrifugal - TAIKO KIKAI INDUSTRIES CO., LTD. / EMCN-200MD
14.8	No. of Pumps	2
14.9	Total capacity	500 m ³ /h (2 x 250m ³ /h)
14.10	Location	Engine Room Lower Floor (FR.29 – 30)
14.11	Control Location	Engine Control Room and Cargo Monitoring Room

A15 MOORING EQUIPMENT

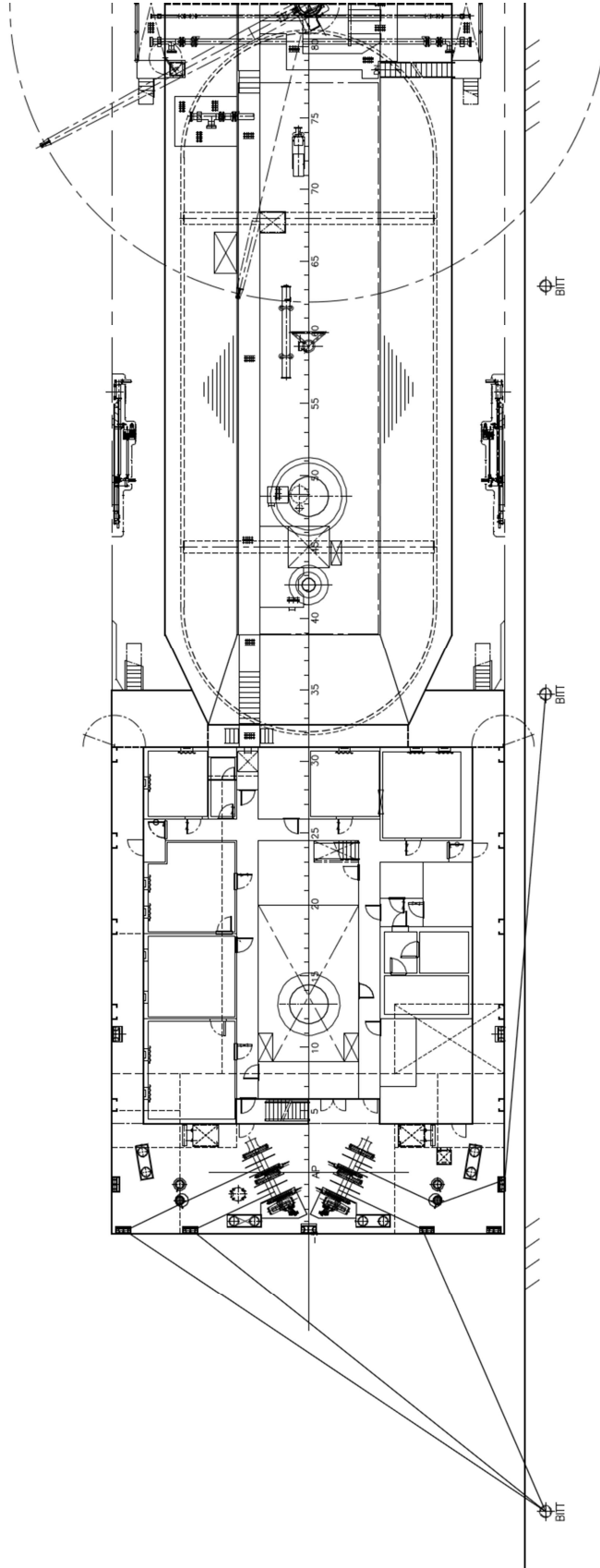
15.1 Ropes and Wires.
On the diagram below indicate the position of winch mounted wires (W) and ropes (R) together with open (O) and closed (C) fairleads.



GENERAL INFORMATION

UPPER DECK

POOP DECK



GENERAL INFORMATION

Mooring Winches					
	No	Motive power (steam,hydraul)	Heaving power	Brake Capacity	Hauling speed
Forecastle	2	hydraulic	80.4 Kn	256 Kn	15 m/min
Poop	2	hydraulic	80.4 Kn	256 Kn	15 m/min
15.3	Anchors and Windlasses				
	Windlass motive Power (steam, hydraulic)	hydraulic			
	Hauling power	133.3 kN			
	Brake holding capacity	770 kN			
	Date of last test				
	Anchor type	Stockless AC14 Type			
	Weight	Total 6.080 tonnes (Each side 3.040 tonnes)			
	Is spare carried	NO			
	Cable diameter	56 mm			
	No of shackles port	9			
	No of shackles starboard	10			
15.4	Windage				
	Windage on ballast draught	Abt. 1,380 m ²			
	Windage full loaded	Abt. 1,110 m ²			

A16 NAVIGATIONAL EQUIPMENT

Is the following equipment fitted :	YES	NO
16.1 Magnetic compass	x	
16.2 Gyro compass and repeaters	x	
16.3 Radars	x	
16.4 Radar plotting equipment	x	
16.5 Arpa	x	
16.6 Echo sounder	x	
16.7 Speed/Distance indicator	x	
16.8 Doppler log	x	
16.9 Rudder angle, RPM, controllable pitch and Thrusters indicators	x	
16.10 Rate of turn indicator	x	
16.11 Radio D.F.	x	
16.12 Navtex receivers	x	
16.13 Satellite navigator	x	
16.14 Decca navigator		x
16.15 Loran C		x
16.16 Sextants	x	
16.17 Signal lamp (aldis)	x	
16.18 Course recorder	x	
16.19 Engine order printer		x
16.20 What chart outfit coverage is provided if limited, indicate areas covered	No limitation	
16.21 Formal chart correction system in use	Aut. Outf. Manag. System	

A17 COMMUNICATION EQUIPMENT

Is the following equipment fitted :		YES	NO
17.1	Is ship with GMDSS	X	
17.2	Radio telegraph main transmitter including facility to transmit on radio telephone distress frequency	X	
17.3	Radio telegraph main receiver including facility to receive on radio telephone distress frequency	X	
17.4	Radio telephone distress frequency watch receiver	X	
17.5	Main radio antenna	X	
17.6	Radio telegraph reserve transmitter		X
17.7	Radio telegraph reserve receiver		X
17.8	Reserve radio antenna		X
17.9	Are the main and reserve installation electrically separate and electrically independent of each other		X
17.10	Radio telegraph auto alarm		X
17.11	2182 KHZ bridge watch receiver	X	
17.12	Alarm signal generating device	X	
17.13	VHF radio	X	
17.14	Inmarsat satellite communications system if yes, state identification number	X	
17.15	Telephone if yes, state identification number		
17.16	Telephone if yes, state identification number		
17.17	Weather fax	X	
17.18	Epirbs		X
17.19	At least three survival craft two-way radio telephone apparatus	X	
17.20	Emergency lifeboat transmitter		X
17.21	Full set of publications	X	
17.22	Satellite Epirb	X	
17.23	VHF Epirb		X
17.24	Radio transponder for survival craft	X	





C A R G O S Y S T E M S

SECTION

B

B1 CARGO - GENERAL INFORMATION

1.1	List products which the ship is certified to carry	Ammonia anhydrous, Propylene, Propane, Butane, Pentanes, Pentene, Butane-propane mixtures, Butylenes (inhibited), Butadiene (inhibited), Vinyl Chloride Monomer (V.C.M.), Isoprene (inhibited), Commercial propane (max. 8 mol% ethane at 1.013 bara in liquid phase)
1.2	Minimum allowable tank temp.	-51 °C
1.3	Maximum permissible tank pressure	8.5 Bar
1.4	List grades which can be transported simultaneously	
1.5	List grades which can be loaded or discharged simultaneously	
1.6	State natural tank segregation. (N.B. separation obtained by the removal of spools or by insertion of blind flange)	
1.7	Number of products, (gas) that can be conditioned by reliquefaction simultaneously.	

B2 CARGO TANKS

2.1	No. and type of cargo tanks	2 Type C
2.2	Maximum allowable relief valve setting	0.85MPaG
2.3	Safety valve set pressure - if variable give range for pilot valve	
2.4	Maximum vacuum	
2.5	Maximum cargo density	973kg/m ³ (VCM)
2.6	Maximum rate of cool-down	°C/hr
2.7	State any limitations regarding partially filled tanks	
2.8	State allowable combinations of filled and empty tanks	

B3 CARGO TANK CAPACITIES

Complete the following table (Except tank dome capacity)

TANK	Capacity CBM	Capacity CBM	PROPANE	AMMONIA	N-BUTANE	VCM
	100% (m3)	98% (m3)	Tonnes -42.8°C	Tonnes -33°C	Tonnes -0,5°C	Tonnes -13,4°C
1	3,515	3,444	1,996.2	2,347.3	2,073.2	3,343.9
2	3,516	3,444	1,996.2	2,347.3	2,073.2	3,343.9
TOTALS	7,031	6,888	3,992.4	4,694.6	4,146.4	6,687.8

B4 LOADING RATES

	PRODUCT	RATE (Tonnes/hr)	
		With vapour return	Without return
4.1	From refrigerated storage	BUTANE	
4.2		PROPANE	
4.3		AMMONIA	
4.4			
4.5			
4.6			
4.7			
	PRODUCT	RATE (Tonnes/hr)	
		With vapour return	Without return
4.8	From pressure storage	BUTANE 0°C	
4.9		PROPANE -42°C	
4.10		AMMONIA -33° C	
4.11			
4.12			
4.13			

B5 DISCHARGING - GENERAL

Cargo pumps		
5.1	Type of pumps	Deep well pump of vertical centrifugal, multistage design
5.2	Number per tank	1 set
5.3	Rate (per pump)	260 m³/h
5.4	Delivery head	120 m
5.5	Maximum density	0.973 (VCM)
Booster pumps		
5.6	Type of pump	Horizontal centrifugal pump
5.7	Number	1 set
5.8	Rate (per pump)	260 m³/h
5.9	Delivery head	120 m
5.10	Maximum density	0.973 (VCM)

B6 DISCHARGE PERFORMANCES

Full cargo discharge times (using all main pumps)

		MANIFOLD		Hours	
		BACK PRESSURE		With vapour return	Without return
6.1	From refrigerated				
6.2		1 bar (with 2 deepwell)			
6.3		2 bar (with 2 deepwell)			
6.4		4 bar (with 2 deepwell)			
<hr/>					
		MANIFOLD		Hours	
		BACK PRESSURE		With vapour return	Without return
6.5	Pressurized				
6.6		1 bar (with 2 deepwell)			
6.7		2 bar (with 2 deepwell)			
6.8		4 bar (with 2 deepwell)			

B7 UMPUMPABLES

	TANKNO.	1	2	3	4	5	6	TOTAL TONNES
7.1	Vapour							
7.2	Liquid	0.18 m3	0.18 m3					0.36 m3
7.3							Total quantity	0.36 m3

B8 VAPORISING UNPUMPABLES

8.1	Process used	
	Time to vaporise liquid unpumpables remaining after full cargo discharge :	
8.2	- Propane	
8.3	- Butane	
8.4	- Ammonia	
8.5	- Propylene	
8.6	-	
8.7	-	

B9 RELIQUEFACTION PLANT

9.1	Plant design conditions	Air temperature 45 °C
		Sea temperature 32 °C
	Plant type :	
9.2	Single stage/direct	<input type="checkbox"/> NO
9.3	Two stage/direct	<input type="checkbox"/> YES
9.4	Simple cascade	<input type="checkbox"/> NO
9.5	Coolant type	Water glycol
	Compressors	
9.6	Type	Vertical,Oil-free,Reciprocating
9.7	Number	2
9.8	Capacity (per unit)	740MJ/h(NET)
9.9	Are they oil-free	YES

B10 COOLING CAPACITY

State cooling capacity (in Kcal/hr) for :		
10.1	Propane	@ -42°C
10.2		@ -20°C
10.3		@ - 5°C
10.4	Butane	@ - 5°C
10.5		@ 0°C
10.6		@ 0°C

B11 CARGO TEMPERATURE LOWERING CAPABILITY (AT SEA)

Time taken to lower the temperature of:		
11.1	Propane from	+10°C to -42°C
11.2		-5°C to -42°C
11.3		-38°C to -42°C
11.4		+20°C to -0.5°C
11.5		+10°C to -0.5°C
11.6	Butane from	+20°C to -0.5°C
11.7		+ 10°C to -0.5°C
11.8		+10°C to -5°C
11.9	Ethylene from	-95°C to -
11.10	Ethylene from	-98°C to -

B12 INERT GAS

Main inert gas and nitrogen plant			
12.1	Type of system	PSA type Nitrogen Gas Generating Equipment	
12.2	Capacity	1) 99.9% N ₂ : 400 Nm ³ /hr (99.95% N ₂ Hi mode: 350 Nm ³ /hr) 2) 99.0% N ₂ : 610 Nm ³ /hr (99.5% N ₂ Hi mode: 550 Nm ³ /hr) 3) 97.0% N ₂ : 780 Nm ³ /hr (98.0% N ₂ Hi mode: 735 Nm ³ /hr) 4) Standard dry air : 1,839 Nm ³ /hr 5) Low q'ty dry air : 200 Nm ³ /hr	
12.3	Composition of inert gas	99.9% N ₂ O ₂ : <1000 ppm CO ₂ : <5 ppm NO _x : Nil N ₂ : 99.9%* * Include Argon app. 1.5%	99.0% N ₂ <1.0 % <10 ppm Nil 99.0%*
		Standard dry air Air : 100.0%	97.0% N ₂ <3.0 % <20 ppm Nil 97.0%* Low q'ty dry air 100.0%
12.4	Dew point	Normal : Minus(-) 55 ~ minus(-) 60 degC Dry air : Minus(-) 18 degC	
12.5	Used for	Gas-Freeing of Cargo tank; Breathable airing of Cargo tank; Air-Purging (Innerting) of Cargo tank; Dry-Up of Hold space; Padding of Hold space	
	Nitrogen		
12.6	No of bottles	N/A	
12.7	Capacity (each one)	N/A	
12.8	Used for		
Main	inert gas and nitrogen	Nitrogen	

B13 CARGO TANK INERTING/DE-INERTING

13.1	Time taken from fresh air to under 5% O ₂ at -25°C dewpoint	
	Time taken from cargo vapour to fully inert at -25°C dewpoint	
13.2	When : Inert gas density less than product	
	Inert gas density greater than product	

B14 GAS FREEING TO FRESH AIR

14.1	Plant used	Nitrogen Gas Generating Equipment
14.2	Time taken from fully inerted condition to fully breathable fresh air	

B15 CHANGING CARGO GRADES

In this table write down time to change products (in hrs). Write also consumption of nitrogen.

	From	PROPANE	BUTANE	PROPYLENE	AMMONIA	VCM
To		TIME/CONS.	TIME/CONS.	TIME/CONS.	TIME/CONS.	TIME/CONS.
	PROPANE					
	BUTANE					
	PROPYLENE					
	AMMONIA					
	VCM					

B16 DECK TANK CAPACITY

	Tank capacity without tank dome	80.3 Cbm
16.1	Propane capacity	Cbm NA
16.2	Butane capacity	Cbm NA
16.3	Ammonia capacity	Cbm NA
16.4	Nitrogen capacity	Ncm NA

B17 PRE-LOADING COOLDOWN

In the table below, show time and quantity of coolant required to cooldown cargo tanks from ambient temperature and fully gassed up state sufficient to allow loading to commence.

	PRODUCT	QUANTITY REQUIRED	TIME With return line
17.1	ETHYLENE		
17.2	PROPANE		
17.3	BUTANE		
17.4	AMMONIA		
17.5	VINYL		

B18 VAPORISER

18.1	Type of vaporiser	Horizontal shell & tube type
18.2	Number fitted	1
18.3	Capacity (per unit)	500Ncbm/hr vapour
18.4	Liquid supply rate	cbm/hr liquid
18.5	Delivery temperature	0~40 °C

B19 BLOWER

19.1	Type of blower	
19.2	Rated capacity	
19.3	Delivery pressure	

B20 CARGO RE-HEATER

20.1	Type of re-heater	Horizontal shell & tube type
20.2	Number fitted	1
20.3	Heating medium	Sea water
Discharge rates with sea water at 16°C to raise product temperature:		
20.4	for propane from -51°C to 0°C	250 m3/h
20.5	for ammonia from -33°C to 0°C	

B21 HYDRATE CONTROL

21.1	Freezing point temperature of Depressant	
21.2	Quantity of Depressant carried	
21.3	Means of injection	

B22 CARGO MEASUREMENT

LEVEL GAUGES		
21.1	Are level gauges local or remote	Remote
21.2	Manufacturer	MUSASINO CO., LTD.
21.3	Type	Magnetic float type
21.4	Rated accuracy	±10mm
21.5	Certifying authority	NK
TEMPERATURE GAUGES		
22.6	Manufacturer	HYODA INSTRUMENTS
22.7	Type	Drip-proof type
22.8	Rated accuracy	±2°C
22.9	Certifying authority	
PRESSURE GAUGES		
22.10	Manufacturer	NAGANO KEIKI CO.,LTD
22.11	Type	Weather proof type
22.12	Rated accuracy	±1.6%F.S.
22.13	Certifying authority	
OXYGEN ANALYSER(酸素分析装置)		
22.14	Manufacturer	RIKEN KEIKI CO., LTD.
22.15	Type	
FIXED GAS DETECTOR(固定式ガス検知器)		
22.16	Manufacturer	RIKEN KEIKI CO., LTD.
22.17	Type	
22.18	No of points detected	
PORTABLE GAS DETECTOR(携帯式ガス検知器)		
22.19	Number	
22.20	Manufacturer	RIKEN KEIKI CO., LTD.
22.21	Type	
TOXIC GAS INDICATOR(有毒性ガス測定器)		
22.22	Number	
22.23	Type	
TOXIC GAS INDICATOR TUBES(有毒性ガス検知管)		
22.24	Number	
22.25	Products	
22.26	Exp.dates	
TANKSCOPE(タンク内視器)		
22.27	Type	

B23 CARGO SAMPLING

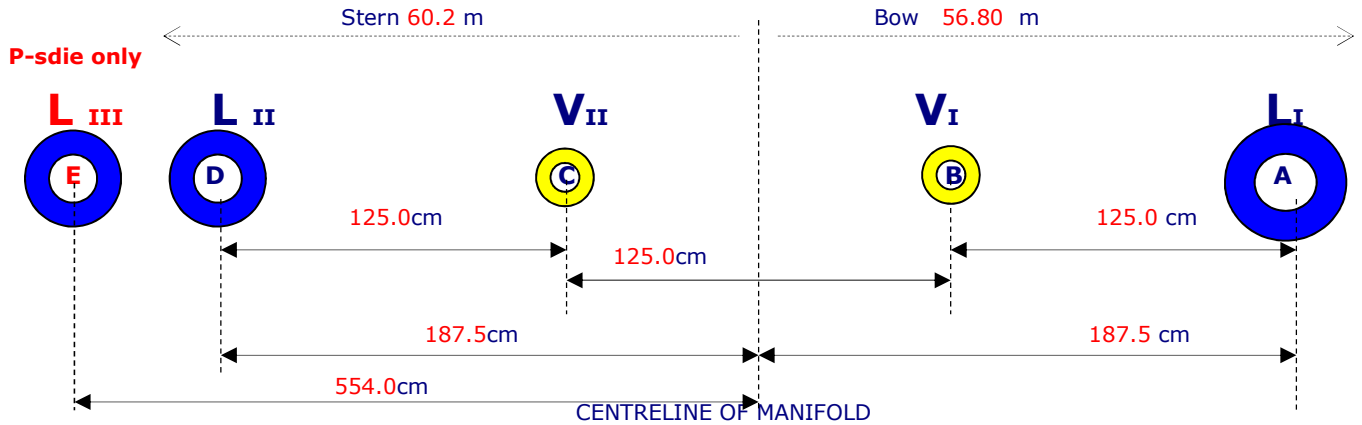
23.1 Fill the following table

CARGO TANKS	CARGO TANKS	CARGO TANKS	CARGO TANKS
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6

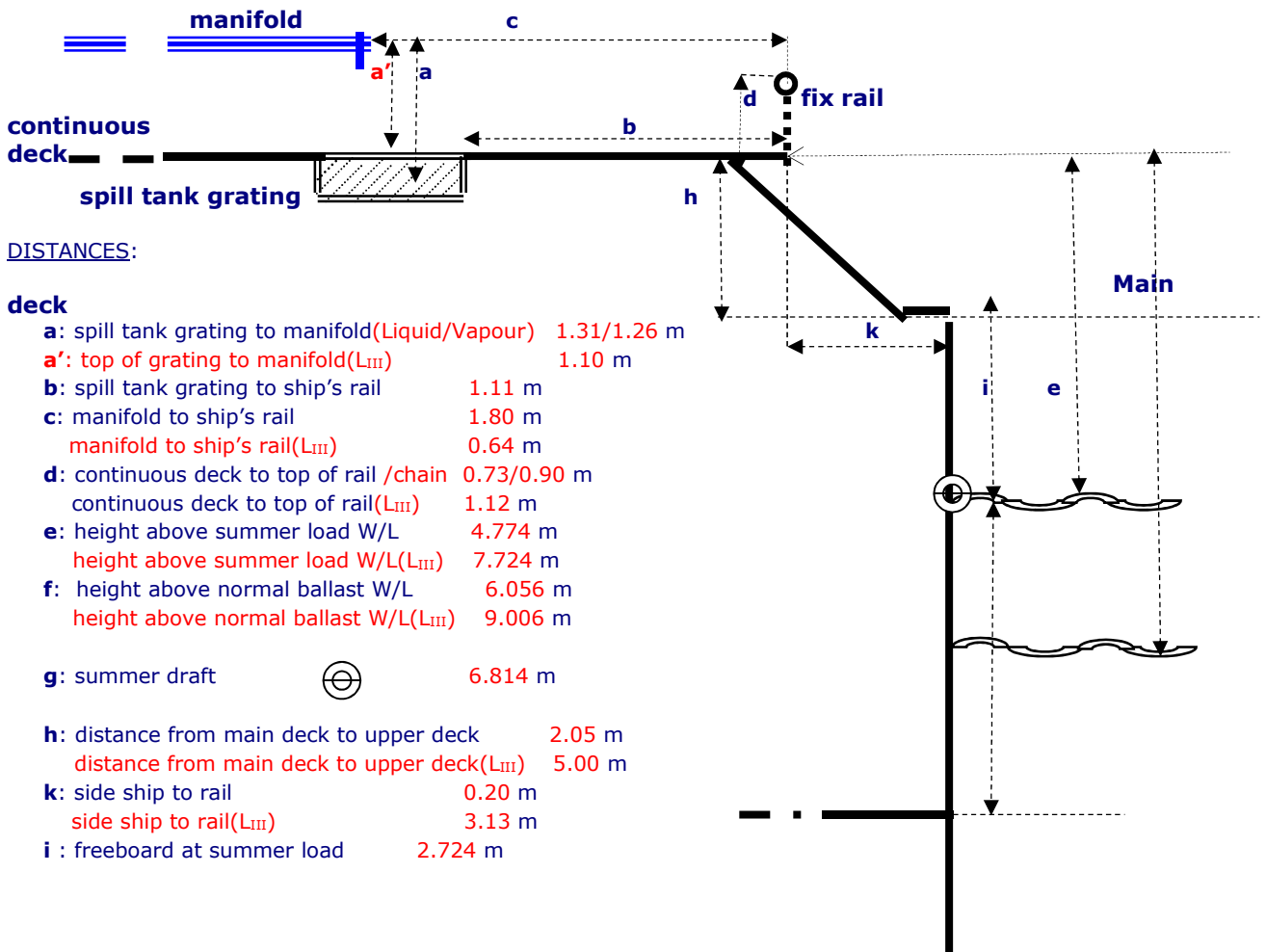
23.2 Can sample be drawn from:			
- Tank vapour outlet	- Tank vapour outlet	- Tank vapour outlet	- Tank vapour outlet
- Manifold liquid line	- Manifold liquid line	- Manifold liquid line	- Manifold liquid line
- Manifold vapour line	- Manifold vapour line	- Manifold vapour line	- Manifold vapour line
- Pump discharge line	- Pump discharge line	- Pump discharge line	- Pump discharge line
23.3 State connection type and size	SCREW – 8 millimetres	23.3	State connection type and size

B24 CARGO MANIFOLD ARRANGEMENTS

CARGO MANIFOLD



Pipe Flange	Duty	Rating	Size	Raised (R) or Flat (F) face
A	Liquid system I	Ansi 300	8"	R
B	Vapour " I	Ansi 150	4"	R
C	Vapour " II	Ansi 150	4"	R
D	Liquid system II	Ansi 300	8"	R
E	Liquid system III	Ansi 150	12"	R



DISTANCES:

deck

- a:** spill tank grating to manifold(Liquid/Vapour) 1.31/1.26 m
- a':** top of grating to manifold(L_{III}) 1.10 m
- b:** spill tank grating to ship's rail 1.11 m
- c:** manifold to ship's rail 1.80 m
- manifold to ship's rail(L_{III}) 0.64 m
- d:** continuous deck to top of rail /chain 0.73/0.90 m
- continuous deck to top of rail(L_{III}) 1.12 m
- e:** height above summer load W/L 4.774 m
- height above summer load W/L(L_{III}) 7.724 m
- f:** height above normal ballast W/L 6.056 m
- height above normal ballast W/L(L_{III}) 9.006 m
- g:** summer draft ⊕ 6.814 m
- h:** distance from main deck to upper deck 2.05 m
- distance from main deck to upper deck(L_{III}) 5.00 m
- k:** side ship to rail 0.20 m
- side ship to rail(L_{III}) 3.13 m
- i:** freeboard at summer load 2.724 m

B25 CARGO MANIFOLD REDUCERS

For Liquid

Ship Side	Terminal Side	Quantity
ANSI #300-200A	ANSI #300-250A	1
ANSI #300-200A	ANSI #300-200A	1
ANSI #300-200A	ANSI #300-150A	1
ANSI #300-200A	ANSI #300-100A	1
ANSI #300-200A	ANSI #300-80A	1
ANSI #300-200A	ANSI #150-250A	1
ANSI #300-200A	ANSI #150-200A	1
ANSI #300-200A	ANSI #150-150A	1
ANSI #300-200A	ANSI #150-100A	1
ANSI #300-200A	ANSI #150-80A	1

For Vapour

Ship Side	Terminal Side	Quantity
ANSI #300-100A	ANSI #300-150A	1
ANSI #300-100A	ANSI #300-125A	1
ANSI #300-100A	ANSI #300-80A	1
ANSI #300-100A	ANSI #150-150A	1
ANSI #300-100A	ANSI #150-125A	1
ANSI #300-100A	ANSI #150-100A	1
ANSI #300-100A	ANSI #150-80A	1

B26 MANIFOLD DERRICK/CRANE

26.1	Is Manifold Derrick provided	NO	
26.2	Is Manifold Crane provided	YES	
26.3	Is lifting equipment same port and starboard	YES	
	If not give details		
26.4	State SWL at maximum outreach	5 Tonnes at maximum outreach 14.6m (5m from side)	