31st.Jan.2014

Form C Gas
for
LPG Carrier "BW EMPRESS"

Specification of the Vessel and the gas installation

Preamble

- Name of LPG Carrier: "BW EMPRESS"

- Owners: BW Gas LPG Ltd./ Clarendon House, 2 Church Street Hamilton HM11, Bermuda

- Flag: ISLE OF MAN

- Built: MITSUBISHI HEAVY INDUSTRIES. LTD.
NAGASAKI SHIPYARD & MACHINERY WORKS
Delivered 28TH.MAR. 2005

- Class: Nippon Kaiji Kyokai,
NS* (Tanker, Liquefied Gases-Maximum Pressure 0.028MPa and Minimum Temperature –46℃, Type 2G)
MNS*(M0)

- Grt/Nrt:

International:	45,965	/ 13,790
Suez:	47,869.89	/ 43,147.78
Panama:	Not Provided	

- IMO GAS CODE: 1983 Amendments to The International Convention for the Safety of Life at Sea, 1974, including International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk.

- USCG: Is vessel approved?: Yes (Certificate of Compliance shall be obtained at the first calling USA ports) Except Alaska waters.

- RINA: Is vessel approved?: No

Hull

- LOA: 230.00 m

- LBP: 219.00 m

- Breadth: 36.60 m

- Depth: 20.80 m

- Draft: 10.783 m (Summer)
10.559 m (Winter)

Mean draft with bunkers and full cargo:

Condition	Specific gravity	Bunker	Corresponding draft
Full cargo	P;0.58(at-46 ℃)	2,366 M/T	10.51 m
Full cargo	B;0.61(at -5 ℃)	1,948 M/T	10.78 m
Heavy Ballast	1.025	2,366 M/T	7.61 m
Normal Ballast	1.025	2,366 M/T	6.92 m

Communication Equipment

- Call letter: 2GJU2

- Radio station normally used: Yes (GMDSS)

- VHF equipment: International VHF (60 channel) provided 2 sets

- INMARSAT Equipment: V SAT system I.D No. 6531586446 (TEL)
  B system I.D No. 323500695
  (TEL) B system I.D No. 323500696
  (FAX) B system I.D No. 323500697
  (Data) B system I.D No. 323500698
  (TLX)C system I.D No. 423593564

Machinery

- Main engine: Mitsubishi-UE marine diesel engine
  Model 7UEC60LS - 1 set
  Output(Max. Cont.): 12,360kw(16,800PS) x 100 rpm
  Grade fuel used:
  Viscosity; Not more than 600cSt at 50 ℃
  Specific gravity; Not more than 0.991 at 15 ℃

- Generator diesel: YANMAR 6N21AL-EV
  970 KW(1,319 PS) x 900 rpm x 3 sets
  880 Kw x 450 V, 60 Hz
  Grade fuel used:
  Heavy oil, Viscosity up to 600cSt at 50 ℃
  The viscosity must be kept in range 11-14cst at engine inlet.

Speed

Consumption (Tons/Day)

- *At sea:

	HFO	Diesel oil
Main Engine (C.S.O.)		
Generator Diesel		
Total		

- In port(Including for unloading service.):

	HFO	Diesel oil
Generator Diesel		
Boiler		
Total		

Speed/Consumption at sea(Only for Propulsion)

- Speed (In 50% ballast and 50% laden moderate weather condition upto and including B/F scale No.5): Knots

- Daily HFO consumption at mean draft 10.3m / 7.1m (only for propulsion): MT/day

Permanent bunkers capacity

- HFO: 2,775.8 m^3 (100%)
  2,366.0 M/T with sp.gr 0.95 (90% full)
- Diesel oil: 342.9 m^3 (100%)
  265.0 M/T with sp.gr 0.87 (90% full)

Cargo installation

1. Transportable products and respective quantities:

Tank name	Volume m^3 (At20 °C)	Propane Tons 98% (ρ=0.58 At-46 °C)	Butane Tons 98% (ρ =0.61 At-5 °C)
No.1 Cargo Tank(P)	8,996.322	5,114	5,378
No.1 Cargo Tank(S)	8,996.322	5,114	5,378
No.2 Cargo Tank(P)	10,259.055	5,831	6,133
No.2 Cargo Tank(S)	10,259.055	5,831	6,133
No.3 Cargo Tank(P)	10,258.991	5,831	6,133
No.3 Cargo Tank(S)	10,258.991	5,831	6,133
No.4 Cargo Tank(P)	9,939.863	5,650	5,942
No.4 Cargo Tank(S)	9,939.863	5,650	5,942
Total	78,908.462	44,852	47,172

2. Tanks working pressure:

- Max. pressure: 0.028 MPa (Plenum)
- Min. pressure: -0.007 MPa (Vacuum)

3. Minimum temperature acceptable in tanks:

- All Cargo Tanks: -46 ℃

4. Loading rate:

- ex atmospheric storage:

All Tks Propane;	P. 4,400 m^3/Hr
3 Tks P./ 1 Tk B.;	P. 2,200 / B. 1,100 m^3/Hr
2 Tks P./ 2 Tks B.;	P. 2,200 / B. 2,200 m^3/Hr
1 Tk P. / 3 Tks B.;	P. 1,100 / B. 2,200 m^3/Hr
All Tks Butane;	B. 4,400 m^3/Hr

- ex pressurized storage: Not practical

5. Cargo pump:

- Number and type: 8 Sets, Submerged vertical electrical motor driven centrifugal type.
  550 m^3 /Hr x 100 mTH x 8 sets

- Location: Pump is located in Cargo tank sump which shall be built in the bottom of tank, one each in port and starboard compartment, close to centerline bulkhead and after end of cargo tank.

- Max. specific gravity permissible: 0.61

- Time for discharging full cargo using all pump against backpress 100 mTH at sp.gr 0.61: about 20 hours with vapor return from shore.

- Max. back-pressure when working in parallel: 100 mTH

- Cargo remaining onboard in cargo tanks after completion of pumping:
  Total about 300 M/T for coolant as ordinary cargo operation.
  (100 M/T as liquid and 200 M/T as vapor.)

- Special Stripping System:
  Emergency cargo eductor (abt. 125 m^3/Hr) is provided in each tank.

6. Cargo (LPG) refrigerating system:

- Number and type: 4 sets of refrigeration plant, Direct expansion type.

- Capacity: Suction capacity; abt 1,360 m^3/h
  Suction condition; -18 ℃, 0.02 MPa G
  Delivery pressure; 2.0 MPa G
  Cooling capacity; 189,000 Kcal/h (for Propane)
  302,000 Kcal/h (for Butane)

- Oil free: Yes

7. Inert Gas System

- Does the vessel use inert gas?: Yes

- Utilization: When LPG tanks and void spaces to be required for inerting and gasfreeing.

- Type and capacity: Oil burning type with cooler and drying unit.
  Delivery capacity: 3,000Nm^3/h
  Delivery condition: max. 0.03 MPa G
  Dew point: -10 ℃
  Oxygen content: 1% (max.)

8. Gas Freeing:

- Can this operation be carried out at sea?: Yes.

- State method: Full stripping of cargo.
  Sparging for remaining liquid with LPG compressor.
  Inerting with inert gas system.
  Airing with aeration fan.

- Advice time required and consumption of inert gas if any:
  Full stripping; 2 Hrs
  Sparging; 22 Hrs
  Inerting; 36 Hrs
  Airing; 36 Hrs (Total; 4 Days)

- The vessel equipped with:
  Inert gas system: 3,000 Nm^3/Hr
  Aeration fan: 6,000 Nm^3/Hr

9. Changing Grade:

- Can this operation be carried out at sea?: Yes

From Propane to Butane: One (1) day

a) Sparging and temperature control with hot propane vapor by LPG compressor. (Tank bottom temp. to be risen up more than –2 ºC) Provided: Vapor contamination is permissible on cargo loading.

From Butane to Propane: Six (6) days for 2 tanks

a) Sparging with hot butane vapor by LPG compressor.
b) Butane vapor in tank to be changed with propane vapor.
c) Tank cooling to be commenced with propane liquid through Top spray nozzle.

Provided: Abroad 20-30 M/T LPG gas to be blown off.

10. Cargo Reheater(Booster/Heater system):

- Booster pump:

Number and type: 1 set of Explosion-proof, electric motor driven horizontal type centrifugal pump

Discharge rate: 400 m^3/h x 150 mTH (S.G. = 0.58)

- LPG heater:

Number and type: 1 set of shell and tube type, seawater heated

Discharge rate: 300 m^3/h inlet temp.: -42 ºC
outlet temp.: 0 ºC (S.G. = 0.58)
[Sea water inlet/outlet temp.:Minimum +9.5ºC / +4.5ºC]

11. Cargo Vaporizer:

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

- Type of Vaporizer; 1 set of shell and tube type, seawater heated

- Capacity of Vaporizer; 2,000 m^3/h, 1 set

12. Refrigerating Apparatus:

- Is it independent of cargo?: Yes

13. Measuring Apparatus:

- What gauges onboard: Magnetic float type level gauges.

- Location and type: Two (2) magnetic float type liquid level gauges, one (1) for each port and starboard compartment, shall be furnished and installed in each cargo tank.

14. Samples:

- Where can samples be taken: No, but available for gas sample. (Not liquid)

- Are sample bottles available onboard and what number: No

15. Cargo Lines:

- Is vessel fitted with midship manifolds?: Yes

Distance of manifold center:

From Stem	113.93 m
From Stern	116.08 m
From Side	4.00 m
Above Deck	1.77 m
Above Water Line	11.82 m (Full load condition)

(Refer to attached drawing)

- Is vessel fitted with stern discharge?: No

- Is vessel fitted with fore discharge?: No

- Liquid Line: Diameter; 16"
  Flanges Manifolds; ANSI 150psiG 12" (Reducer)

- Vapor Line: Diameter; 10"
  Flanges Manifolds; ANSI 150psiG 12" (Reducer)

- High Pressure Buster Pump Line: 8"
  Flanges Manifolds; ANSI 300psiG 6" (Reducer)

- What reducers onboard: ANSI 150psiG 16" x 10" x 2 pcs
  10" x 8" x 2 pcs
  10" x 6" x 2 pcs

  ANSI 300psiG 6" x 8" x 1 pcs

16. Lifting Devices:

- Where situated: After Bridge and amidships by cargo crossover.

- Number of lifting capacity:

Amidships: 1 set x 7.5 M/T Hose handling crane.
Max. outreach of 1.0m from ship's side at angle of 18 degrees to horizontal

Aft: 1 set x 5 M/T Provision and Engine parts Handling crane
1 set x 0.9 M/T Provision handling crane.

17. Hoses:

- Number and size: Not provided

18. Special Facilities:

- How many grades can vessel segregate: Two(2) grades

- Is vessel able to load/discharge two or more grades simultaneously?:
Yes, Two(2) grades

- Can vessel sail with slack tanks?: Yes

- Fresh water generator: Vessel is equipped with Sasakura KM30 type, capacity 30 Ton/day (When M.E running)