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NEW BUILDING OF SIX [6] 174,900 CUBIC METRES, TWIN SKEG DFDE ELECTRIC PROPULSION SYSTEM LIQUIDFIED NATURAL GAS CARRIER [LNGC] AS MACHINERY AND OUTFITTING SURVEYOR ON CONSTRUCTION, COMMISSIONING, SEA AND GAS TRIALS OF THE VESSELS

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ABSTRACT

This paper discusses in detail the project description, facility description, engineering objective, and scope of work. In section two, is the description of the supervised construction of six [6] x 174,900 cubic meters twin skeg DFDE LNGC as an outfitting and machinery surveyor. The role include but not limited to the review of plan approval and drawings to ensure conformity with applicable rules, regulations, codes and owner's specification requirements, attend Factory Acceptance Test [FAT] as flag State representative, installation and commissioning of new machinery and equipment onboard ensuring building specifications follows international standards, IGC Codes and Class Rules, verification of basic structural, outfitting and piping drawings are in accordance with the requirements of the ship specification and issuance of Non-Conformity Report [NCR] where applicable.

KEYWORDS: Commissioning, Natural Gas, LNGC,

INTRODUCTION

Ship classification may be regarded as the development and worldwide implementation of published Rules and Regulations which, in conjunction with proper care and conduct on the part of the Owner and operator, will provide for the structural strength of [and where necessary the watertight integrity of] all the necessary parts of the hull and its appendages; the safety and reliability of the propulsion and steering systems; and the activeness of those other features and auxiliary systems which was built into the ship to establish and maintain basic conditions on board whereby appropriate cargoes and personnel can be safely carried whilst the ship is at sea, at anchor, or moored in harbor[1]. Proposals for any subsequent modifications or additions to the scantlings, arrangements or equipment shown on the approved plans are also to be submitted in writing and on plans for approval. Where the proposed construction of any part of the hull or machinery is of novel design, or involves the use of unusual material, or where experience, in the opinion of the Classification Committee, has not sufficiently justified the principle or mode of application involved, special tests or examinations before and during service may be required. In such cases a suitable notation may be assigned. The materials used in the construction of hulls and machinery intended for classification are to be of good quality and free from defects and are to be tested in accordance with the requirements of the Rules for the Manufacture, Testing and Certification of Materials. The steel is to be manufactured by an approved process at an approved works. Alternatively, tests will be required to demonstrate the suitability of the steel. New ships intended for classification are to be built under LR's Special Survey. From the point of work commencement until the completion of the ship, the Surveyors should be convinced enough that the materials, arrangements and workmanship are satisfactory and also in accordance with the Rules or the approved plans. Any items that are not in accordance with the approved plans, or any material, workmanship or arrangements found to be unsatisfactory, are to be rectified. Copies of approved plans [showing the ship as built], essential certificates and records, required loading and other instruction manuals are to be readily available for use when required by the attending Surveyors, and may be required to be kept on board. When arrangements are such that

essential machinery can be operated by remote and/or automatic control equipment, the control equipment is to be arranged, installed and tested in accordance with LR's Rules and Regulations.

The purpose of this project is the construct of six DFDE LNGC carriers under the Project BGT Plus for the NLNG operations. Okwong attended the Outfitting and Machinery Surveyor alongside Surveyors from Lloyds Register, the Classification Society of the 4 ships built at Samsung Heavy Industries Shipyard in Geoje, South Korea.

Category	Type	Capacity [m]	Note
Dry Dock	Dock No. 1	283 x 46	LNGC, Drillship
Dry Dock	Dock No. 2	390 x 65	LNGC, Drillship
Dry Dock	Dock No. 3	640 x 98	LNGC, LNG-FPSO

Ship Particulars

Name	LNG Finima II
IMO Number	9690145
Flag	Bermuda [United Kingdom]
Call Sign	ZCEQ4
MMSI	310722000
Type	LNG Tanker
Date of Build	November 2015
GRT	116,568
Owner	Bonny Gas Transport Limited
Length Overall [m]	292
Beam [m]	48
Draught [m]	10.2
Main Engine	
Auxiliary Engine	
Area of Trade	International

An application was made by the ship owner [Bonny Gas Transport] to register the vessel under the Bermuda [UK] flag hence the requirement for an initial survey of all ship plans, specifications and other documentations to the Belfast Marine office using the application form [SUR 245] alongside the payment of application fee.

The application form lists essential design information, drawings and documentation and the substances for which certification is sought. It is designed to contain a complete record of the drawings and documentation showing the ships degree of compliance with the Gas Carrier Code. It is observed that being a new build, certain details required were not available until final drawings have been produced. The lead surveyor Engr Keith Patterson was the focal point between the MCA and BGT/LR concerning survey work. The examination of the ship arrangements and equipment [i.e. the documentation referred to above]were reviewed to ensure the application comply with the applicable requirements of the regulations and codes prior to approval.

METHODOLOGY

Engineering Objective

Survey reports come in several different formats but essentially, they fall into two categories viz: -Reports for new construction and reports for existing ships. Reports for new construction may cover individual items of equipment/machinery or will summarize the construction/installation of the ship. They do not normally contain large amounts of free narrative i.e. they are not a record of the surveyor's activities over time, but rather they contain the essential particulars of the equipment they apply to, together with a standardized confirmatory statement that the item has been manufactured in accordance with the applicable rules. For individual items of equipment/machinery, these particulars are important. Anchors and chain cables, for example, may well have been manufactured in accordance with the rules but only the surveyor attending the ship that they are being fitted into can say that they are of the correct, weight, size and grade for individual application. In this sense, survey reports on individual items of equipment are effectively certificates for that equipment and are, in fact, issued to the manufacturer as the deliverable for the service that he receives from the classification society. Because new construction reports are essentially a record of equipment particulars with only minimal free narrative, they lend themselves to being highly structured and made up as pro-forma templates with the surveyor only requiring filling in the relevant particulars. New construction reports for the building of a ship and the installation of the machinery are also a record of particulars as opposed

to a record of activities. These reports represent the first entry of classification data into the records or database [Lloyds Register calls these reports "First Entry Reports"] but they are not classification certificates i.e. they are not a deliverable to the owner but rather a means of in-putting information to the classification database that is highly structured and made up as pro-forma templates with the surveyor only having to fill in the relevant data.

Project Scope of Work

Except for some boilers, the machinery that were surveyed are those associated only with the propulsion and manoeuvring systems and some other essential services such as fire pumps and piping systems. Non-essential machinery such as domestic refrigeration systems, domestic freshwater and sanitary systems, do not require survey for class purposes. However, for safety purposes, domestic boilers operating above a certain pressure were surveyed. Lloyds Register specifies this at above 3.4 bar. The outfitting and machineries installation supervision is a multi-disciplinary endeavour involving marine engineering, electrical engineering, control engineering and fired and unfired pressure vessel experience. The entire process commences with a design appraisal, material certification, survey of equipment and components at the manufacturer, survey during installation at ship, sea trials, certification and reporting.

Several IACS Unified Interpretations apply to the machinery installation, mainly for design appraisal purposes but some aspects do cover the remaining elements of new construction. Useful U.Is are:

- URE Electrical Installations
- URK Keyless Propellers
- URM Machinery Installation
- URP Pipes and Pressure Vessels

The process is further described in detail as follow:

Design Appraisal

The plans and information that require to be submitted are specified in the rules. Piping systems drawing are submitted only as line diagrams or schematics. The initial task is to ensure that the detail piping workshop and installation drawings comply with information shown on the schematics. The submission was the responsibility of the machinery manufacturer who provided the alignment and vibration calculations. It is the combination of these items that determine the alignment and torsional vibration characteristics of the machinery installation. The submission of alignment and torsional vibration calculations is therefore an important aspect of machinery design appraisal. Practically all modern machinery installations of any size have some level of automatic or remote-control incorporating alarms and safety systems. Such systems are not mandatory for classification purposes as it is feasible for an engine room to be fully attended and all machinery operated under local manual control but where they are fitted, certain requirements must be fulfilled. The level of submissions for control engineering design appraisal is determined by the degree of automation that is incorporated and this may vary from individual items of unattended machinery to a fully unattended engine room.

For most modern ocean going ships such as the LNGC under construction, the machinery installation complied with the requirements for a fully unattended machinery space [given a class notation of UMS by LR] or one with all machinery controlled from a central control room or station [class notation CCS by LR]. Okwong's responsibility as part of the attending surveyor team was to ensure that the detail drawings match the approved plans in the same way as the structural team matches the steelwork production drawings to the approved scantling plans.

Material Certification & Survey at Manufacturers

Current block and ring construction methods allied with modular machinery outfitting techniques ensured that machinery items, particularly pipework were installed on the first block as it is processed through the fabrication shop. Pipework is the only machinery that was manufactured at the SHI shipyard. Other machineries such as main engines, auxiliary machinery and most other item of plant that went into the engine room were bought-in by the shipyard as complete packages from third party vendors with the survey of items subject to class surveys carried out at source at the manufacturer. Materials such as crank shafts, con rods for main and auxiliary engines, steel plate for air receivers and boilers were subjected to rigorous material certification at the manufacturer's sites.

Survey During Installation at Ship

Pipework

Material certification and traceability were completed with welding procedures and workmanship approved and examined. Correct alignment of pipe butt welds with a certain level of Non-Destructive Examination of completed joining wells were verified and confirmed to be in accordance with the approved plans. Completed systems were examined for ease of access. Other requirements for pipework include ensuring system identification is in accordance with good engineering practice with the method of joining, support and provision for thermal expansion are suitable. Pipework components such as valves, sight glasses, flexible hoses, proprietary couplings were verified to be of approved type and completed pipework were pressure tested to 1.5x the design pressure.
During the pipework installation, the following precautions were taken:

- Guarding against escape of flammable liquids on to hot surfaces;
- adequate support to avoid excessive vibration particularly small-bore FO/LO and compressed air;
- compressed air intakes sited clear of areas where flammable vapours can accumulate;
- settling and service tanks not sited above boilers or other heated surfaces;
- adequate provision for expansion and drainage of steam piping;
- non-return valves fitted in bilge systems to prevent inadvertent cross flooding;
- inert gas lines to have no dips that would allow water to accumulate and restrict flow;
- drip trays to be fitted as necessary to contain oil spills at boiler furnaces, oil tanks, associated valves and pumps;
- LO and hydraulic systems manually cleaned after installation in addition to flushing;
- internal surfaces of LO tanks, crank cases and gear cases were examined for debris;

Stern Gear

- boring of the stern frame
- fitting the stern tube and aft bearings
- fitting of intermediate bearings
- shaft alignment
- Guidance contained in approved shafting and alignment plans and calculations
- the shipyard alignment procedures were reviewed and found satisfactory;

Fitting of propeller

- fitting of both the working propeller to be witnessed by the surveyor
- axial push-ups for keyed propellers was in accordance with issued guidance figures
- keyway examined with a suitable NDE method after trial shop fitting
- for keyless propellers the following fitting parameters need to be verified to ensure the correct interference fit is obtained:start point loading, required push-up and the above are correct for ambient temperature between 0^{o}C and 35^{o}C
- manufacturer's fitting procedures and fitting parameters were approved at the design approval stage

Chocking and Securing of Main and Auxiliary Machinery

- Use of resin chocks and machinery is aligned using jacking screws
- holding down bolts are placed in position
- adequate damming arrangements are made in way of the holding down bolts. Survey check particularly to ensure surfaces are clean and clear of debris, surfaces are sprayed with releasing agent so that there is no adherence, and any expansion clearance holes required around holding down bolts soft packed
- the damming arrangements provide a complete seal to prevent leakage of the resin
- thicknesses no less than 12mm including thicknesses above any steel fillers
- arrangements are such that no air pockets will form
- resin was poured slowly to allow air to escape
- The approved resin was mixed and poured in accordance with the manufacturer's instructions with attention paid to the ambient temperature

Chocking and Securing of Main and Auxiliary Machinery

- test samples were poured and cured from each mix under the same conditions as the chocksthemselves
- samples were cast separately measuring about 50mm x 50mm and the same thickness as thechock up to a max. of 32mm.
- Separately cast samples should receive the same cycle time and remain in the same environment as the chock.
- More than one batch number of resinswas used thus the chock position of each batch was recorded
- test samples tested for hardness and crushing strength and broken surfaces visually examined for correct mixing

- on completion of the curing cycle, the dams were removed, the holding down bolts torqued to the approved value and the final engine alignment checked

Installation of Pressure Vessels

- installation of pressure vessels are highly specialised thus Okwong didn't participate in the survey of the installation of pressure vessels.

Basin and Sea Trials

- once all machinery and other systems were individually commissioned and tested, basin trials commenced to test integration of the whole machinery installation prior to sea trials
- attending surveyors witnessed specific tests at their discretion and monitored others
- a black-start test was witnessed during basin trials
- surveyors attended sea trials and witnessed/monitored the following:
- endurance trials of several hours running at 100% power achieved in 25%, 50%, 75% stages
- ability of M/E to provide necessary speed, direction and power changes during manoeuvring trials
- correct operation of machinery from local and remote stations
- starting, stopping, reversing, speed governors, telegraphs, safety cut-outs and alarms all tested
- verify the capacity of the air receivers to give the required number of starts without replenishing
- correct operation of the steering gear under maximum ahead speed verified
- verify the windlass can lift the anchor from a specified depth within the required time
- check for gear hammer in geared installations
- record any results of vibration measurements if they are required to establish barred speed ranges

RESULT AND ANALYSIS

	PLAN APPROVAL	
1.01	Products that ship will be permitted to carry. Noting the corresponding minimum special requirements. IGC Code 83/90/00/14 ch.19	
1.02	Plans for ship type, cargo containment, control of vapour space within the cargo tanks, vapour detection, gauging, personnel protection, filling limits for cargo tanks and other special requirements. IGC Code 83/90/00/14 chs.2, 4, 6, 13, 14, 15, & 17	Methane – LNG 1972-2G-F-C-620
1.03	Plans for the freeboard and survival capability. IGC Code 83/90/00/14 ch.2; IS Code Chs.1, 2 and 3	Yes
1.04	Plans for the ship arrangements. IGC Code 83/90/00/14 ch.3	Yes
1.05	Plans for the process pressure vessels and liquid, vapour and pressure piping systems. IGC Code 83/90/00/14 chs.5 and 6	Yes
1.06	Plans for cargo pressure/temperature control. IGC Code 83/90/00/14 ch.7	Yes
1.07	Plans for cargo tank ventilation systems. IGC Code 83/90/00/14 ch.8	Yes
1.08	Plans for the cargo containment system atmosphere control. IGC Code 83/90/00/14 ch.9	Yes
1.09	Plans for the electrical installations. IGC Code 83/90/0/140 ch.10	Yes
1.10	Plans for the fire protection and fire extinction. IGC Code 83/90/00/14 ch.11	Yes
1.11	Plans for the artificial ventilation in the cargo area. IGC Code 83/90/00/14 ch.12	Yes
1.12	Plans for the instrumentation and automation systems. IGC Code 83/90/00/14 ch.13	Yes
1.13	Plans for the use of cargo as fuel. IGC Code 83/90/00/14 ch.16	

1.14	Approved documentation for the alternative design and arrangements for the segregation of the cargo area, where applicable. IGC Code 83/90/00/14 ch.3; SOLAS 74/00/06 reg.II-2/17	N/A
1.15	The stability Instrument, where applicable. IGC Code 83/90/00/14 ch.2	Yes
1.16	The alternative means of verification for intact and damage stability, when a dispensation from carriage of a stability instrument applies. IGC Code 83/90/00/14 ch.2	N/A

SURVEY		
2.01	Segregation in the cargo area and arrangement of the accommodation, service and machinery spaces in accordance with the approved plans. IGC Code 83/90/00/14 ch.3	Yes
2.02	The alternative design and arrangements for the segregation of the cargo area, in accordance with the test and inspection requirements, if any, specified in the approved documentation, where applicable. IGC Code 83/90/00/14 ch.3; SOLAS 74/00/06 reg.II-2/17	N/A
2.03	Examining the arrangements of the cargo pump rooms and cargo compressor rooms. IGC Code 83/90/00 ch.3	Yes
2.04	Confirming manually operated emergency shutdown (ESD) system together with the automatic shutdown of the cargo pumps and compressors are satisfactory. IGC Code 83/90/00/14 chs.5 and 18	Yes
2.05	Examining the arrangement of the cargo control room. IGC Code 83/90/00/14 ch.3	Yes
2.06	Examining accesses to spaces in the cargo area . IGC Code 83/90/00 ch.3	Yes
2.07	Confirming the arrangements for the air locks. IGC Code 83/90/00/14 ch.3	Yes
2.08	Examining the bilge, ballast and oil fuel arrangements. IGC Code 83/90/00/14 ch.3	Yes
2.09	Examining, when applicable, bow or stern loading and unloading arrangements with particular reference to air inlets and entrances to accommodation, machinery and service spaces, electrical equipment, fire-fighting arrangements and means of communication between cargo control room and shore location. IGC Code 83/90/00/14 ch.3	Yes
2.10	Confirming that the cargo tanks arranged and installed are in accordance with approved plans, internally examining the cargo tanks, water ballast tanks and other spaces in the cargo area, ensuring that appropriatenon-destructive and pressure testing are carried out. IGC Code 83/90/00/14 ch.4	N/A
2.11	For containment systems with glued secondary barriers, confirming that a tightness test has been carried out in accordance with the approved procedures of the system manufacturer before and after the initial cool down. Where the designer's threshold values are exceeded confirming that an investigation and additional testing, such as thermo graphic or acoustic emission testing has been carried out, where necessary. IGC Code 83/90/00/14 ch.4	Yes
2.12	Examining during the initial cool down, loading and discharging of first cargo, the comprehensive behavior of the cargo containment system and confirming that the system is in compliance with the plan or design parameters. For vessels that carries the liquefied natural gas, the examination includes witnessing the satisfactory operation of the following systems, if fitted:	Yes
2.12.01	Gas detection system.	Yes
2.12.02	Cargo control and monitoring systems such as level gauging; equipment, temperature sensors, pressure gauges, cargo pumps and compressors, and proper control of cargo heat exchanges, if operating.	Yes
2.12.03	Nitrogen generating plant and/or inert gas generator.	Yes
2.12.04	Nitrogen pressure control systems for insulation, inter-barrier and other annular spaces.	Yes

2.12.05	Re-liquefaction plant.	Yes
2.12.06	Equipment fitted for the burning of cargo vapours, such as boilers, multi-fuel engines or gas combustion units.	Yes
2.12.07	Cofferdam heating systems.	Yes
2.12.08	On-deck cargo piping systems including expansion and supporting arrangements.	Yes
2.12.09	High level alarms, by witnessing topping-off process for cargo tanks. IGC Code 83/90/00/14 ch.13	Yes
2.13	Examining the cargo containment system for cold spots during, or immediately following the first loaded voyage. IGC Code 83/90/00/14 ch.4	N/A
2.14	Examining the cargo and process piping, including arrangements for expansion, hull structure insulation, pressure relief and drainage arrangements, water curtain protection as appropriate, and carrying out a test to dictate any leakage. IGC Code 83/90/00/14 ch.5	Yes
2.15	Confirming that the Cargo system valving arrangements are in accordance with the approved plans. IGC Code 83/90/00/14 ch.5	Yes
2.16	Confirming that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing. IGC Code 83/90/00/14 ch.5	Yes
2.17	Examining the arrangements for cargo pressure/temperature control including, when fitted, any refrigeration system and confirming that any associated alarms are satisfactory. IGC Code 83/90/00/14 ch.Ch.7	Yes
2.18	Confirming that the Cargo tank vent systems, including the pressure relief system and vacuum protection systems, have been installed in accordance with the approved plans, and that the PRV's are type-approved or marked with date of testing. IGC Code 83/90/00/14 ch.8	Yes
2.19	Examining the arrangements for the cargo containment system atmosphere control and environmental control of spaces surrounding type C independent tanks, including the means of storing or generating and drying an inert gas. IGC Code 83/90/00/14 ch.9	Yes
2.20	Examining the electrical installations with particular reference to the certified safe type equipment fitted in gas-dangerous spaces and zones. IGC Code 83/90/00/14 ch.10	Yes
2.21	Examining the arrangements for fire protection and fire extinction. IGC Code 83/90/00 ch.11	Yes
2.22	Examining the fixed fire-fighting system towards the enclosed cargo machinery spaces, and the enclosed cargo motor room and also the confirmation that the installation tests have been completed and that its means of operation is marked satisfactorily. IGC Code 83/90/00/14 ch.11	Yes
2.23	Examining the Fire main with special reference to the hydrants and isolation arrangements been in place, check that the two jets of water reaches all areas of the cargo and also containment area at the required pressure and testing the remote means of starting one main fire pump. IGC Code 83/90/00/14 ch.11	Yes
2.24	Examining and testing the water spray system for cooling, fire protection and crew protection and confirming that its means of operation is clearly marked. IGC Code 83/90/00/14 ch.11	Yes
2.25	Examining and testing the dry chemical powder fire-extinguishing system for cargo area, knowing that the fixed piping has been installed properly and proved clear and also confirm that their means of operation is marked clearly. IGC Code 83/90/00/14 ch.11	Yes
2.26	Examining the appropriate fire-extinguishing system for the enclosed cargo machinery spaces for ships that are dedicated to the carriage of a restricted number of cargoes and the internal water spray system for the tyrret compartmentsand confirming that installation tests have been satisfactorily completed and their means of operation is clearly marked. IGC Code 83/90/00/14 ch.11	Yes

2.27	Confirming the provision and examining the disposition of the firefighters outfits including itheir self-contained compressed air breathing apparatus, and provision of two way portable radiotelephone apparatus of an explosion-proof type or intrinsically safe. IGC Code 83/90/00 ch.11 SOLAS 74/00/12/14 regs. II-2/10.10; FSS Code ch.3	Yes
2.28	Examining, and confirming the satisfactory operation of, arrangements for the artificial ventilation of spaces in the cargo area normally entered during cargo handling operations and checking in particular that: IGC Code 83/90/00/14 ch.12	Yes
2.28.01	It may be controlled from outside the space;	Yes
2.28.02	Warning notices concerning its use have been posted;	Yes
2.28.03	is fixed and of the negative pressure type, permitting extraction from either or both the upper or lower parts of the space when appropriate, for cargo compressor and pump rooms and for cargo control rooms when considered hazardous;	Yes
2.28.04	Is of the positive pressure type for spaces containing electric motors driving cargo compressors or pumps and other non-hazardous spaces within the cargo area, except those containing inert gas generators;	Yes
2.28.05	Exhaust ducts are clear of the ventilation inlets and openings to accommodation spaces, service spaces, control stations and other gas-safe spaces;	Yes
2.28.06	Intakes are arranged to minimise the recycling or hazardous vapours;	Yes
2.28.07	Ducts from hazardous areas are not led through accommodation, service and machinery spaces and control stations.	Yes
2.28.08	The electric motors that drives the ventilation fans are situated outside the ventilation ducts when there is intension for the carriage of flammable products and the ventilation fans and the ducts, in way of the fans only, are of non-sparking construction in hazardous areas;	Yes
2.29	Examining, and confirming the satisfactory operation of arrangements for the artificial ventilation of spaces normally entered other than those covered in the preceding section. IGC Code 83/90/00/14 ch.12	Yes
2.30	Examining, and testing as appropriate, the liquid level indicators, overflow control, pressure gauges, high pressure and, when applicable, low pressure alarms, and temperature indicating devices for the cargo tanks . IGC Code 83/90/00/14 ch.13	Yes
2.31	Examining, and testing as appropriate, the permanently installedgas detection equipment. IGC Code 83/90/00/14 ch.13	Yes
2.32	Examining, and testing as appropriate, the oxygen-deficiency monitoring equipment; IGC Code 14 ch.13	Yes
2.33	Confirming that two sets of portable gas detection equipment suitable for the cargoes to be carried and a suitable instrument for measuring oxygen levels have been provided. IGC Code 83/90/00/14 ch.13	Yes
2.34	Examining, as appropriate, the automation systems used to provide instrumented control, monitoring/alarm or safety functions; IGC Code 14 ch.13	Yes
2.35	Equipment for personnel protection and in particular that: IGC Code 83/90/00/14 ch.14	N/A
2.35.01	suitable protective equipment, including eye protection, is provided for protection of crew members engaged in normal cargo operations, and properly stowed;	
2.35.02	Sufficient, but not less than three of safety equipment each permitting personnel to enter and work in a gas-filled space are provided and are properly stowed;	
2.35.03	An adequate supply of compressed air is provided and examining the spare air bottle, air compressor and charging manifold are provided and properly stowed.	
2.35.04	A stretcher and the medical first-aid equipment, including oxygen resuscitation equipment, when available, for the products to be carried are provided;	
2.35.05	Respiratory and eye protection suitable for emergency escape purposes are provided and properly stowed;	
2.35.06	Decontamination arrangements and eyewashes are operational;	
2.35.07	When applicable, personnel are protected against the effects of a major cargo release by a special suitably designed and equipped space within the accommodation area;	
2.35.08	When applicable, the cargo control room is of the gas-safe type;	

2.36	Examining the arrangements for the use of cargo as fuel and testing that the gas supply to the machinery space is cut off should the exhaust ventilation not be functioning correctly and that the master gas fuel valve may be remotely closed from within the machinery space. IGC Code 83/90/00 ch.16	Yes

CONCLUSION

DOCUMENTATION		
3.01	Loading and information booklet for stability, consisting details of service and ballast conditions, provisions for check other conditions of loading, a summary of the ship's survival capabilities and sufficient information to be certain that the ship is loaded and operated in a safe and seaworthy manner is available on board. IGC Code 83/90/00/14 ch.2	Yes
3.02	Damage survival capability information is supplied on the basis of loading information for all anticipated conditions of loading and variations in draught and trim. IGC Code 83/90/00/14 ch.2	Yes
3.03	Confirming that, where applicable, the approved documentation for the alternative design and arrangements for the segregation of the cargo area is on board; IGC Code 83/90/00/14 ch.2	N/A
3.04	Confirming that, where applicable, the evaluation certificate for the adequacy of type C tank vent systems is provided; IGC Code 83/90/00/14 ch.3; SOLAS 74/00/06 reg.II-2/17	Yes
3.05	Confirming that the approved document for the maximum allowable loading limits together with PRVs setting pressures is on board; IGC Code 83/90/00/14 ch.8	Yes
3.06	Information for the safe carriage of the products to be carried has been provided. IGC Code 83/90/00/14 ch.18	Yes
3.07	Confirming that the approved cargo operations manuals, including relevant procedures for ESD system and emergency isolating operations of PRVs, has been provided. IGC Code 14 ch.18	Yes
3.08	Copy of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk has been provided. IGC Code 83/90/00/14 ch.18	Yes
3.09	Confirming, where applicable, the stability instrument has been approved and is operating satisfactorily;IGC Code 83/90/00/14 ch.2	Yes
3.10	Confirming, when adispensation from carriage of a stability instrument applies, the alternative means of verification for intact and damage stability is recorded on the Certificate of Fitness and is being applied effectively. IGC Code 83/90/00/14 ch.2	N/A

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