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- CARGO HANDLING SYSTEM FOR GAS CARRIER
- CARGO CONTAINMENT SYSTEM FOR GAS CARRIER
- LNG FUEL GAS SUPPLY SYSTEM
- RELIQUEFACTION PLANT

GLORYHOLDER INDUSTRIES ENTERPRISE

Gloryholder Liquefied Gas Machinery (DL) Co., Ltd.



QUALITY MAKES FOR BRAND. PURSUIT OF EXCELLENCE

GLORYHOLDER

Gloryholder Liquefied Gas Machinery (DL) Co., Ltd is an engineering company specialized in design and EPC turn-key deliveries of marine LNG fuel gas supply systems and cargo handling systems for gas carriers and LNG bunkering ships. Our services include system design, equipment manufacturing, full package of equipment delivery, installation & supervision, commissioning and crew training.

We continuously improve and optimize our systems and are committed to provide high quality products and services. Through our global service network and offices, we can provide system training and maintenance service around the world.

Well proven technology, cost efficient solutions and high degree of customer support, has made Gloryholder one of the world leading suppliers within its fields.

BUSINESS FIELD

- Cargo handling system for gas carrier
- LNG fuel gas supply system
- Cargo containment system for gas carrier
- Reliquefaction system

ADVANTAGE

- Unrivaled engineering experience in cargo handling system more than 10 years
- The first domestic company provides cargo handling system for gas carriers
- The earliest domestic company undertakes LNG fuel gas handling system package
- Possess of more than 10 fuel gas system national patents
- Providing EPC turn-key engineering service
- Providing the optimization of system solutions and safe & reliable products

/ Certification

Quality Certification



Patent



Classification Society Certificate



/ What can we do

Engineering Design

- System P&I diagrams
- Gas cargo containment system design
- BOG calculation and management
- Risk analysis
- Arrangement plan on board
- Electrical diagram
- Electrical wiring diagram
- Control & monitoring system
- Emergency shutdown system

Equipments Packaging Supply

- Gas cargo / LNG fuel tanks
- LNG bunkering station
- Fuel gas supply system
- Gasify skid
- BOG Compressor Units
- Water/Glycol auxiliary heating unit
- Re-liquefaction system
- Double walled pipe
- Control console & Motor starter

Installation and commissioning

- Installation guidance on board.
- Commissioning on board
- Gas trial
- Crew training

Product Manufacturing

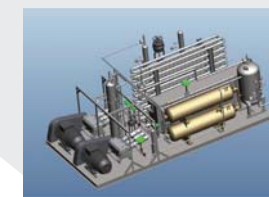
▼ Nitrogen gas generator



▼ Emergency shutdown system



▼ High-pressure FGSS module



▲ Water/glycol auxiliary system



▲ Pressure vessel



▲ Low-pressure FGSS module

/ HISTORY



2017 /

Gloryholder was authorized national invention patent in China for "LGM HP/LP Fuel Gas Supply System of a Ship Power Plant".

Gloryholder was awarded the business contract for two High/Low pressure LNG Fuel Gas Supply Systems to be installed in 7500 CEU Post-panamax PCTCs.

2014 /

Developed the cargo handling system for medium & small scale LNG carriers

2016 /

Gloryholders newly developed "LGM-B" type independent tank received approval in principle by DNV-GL.

Thanks to the vast experiences within the marine liquefied gas field, Gloryholder has become one of the world's leading suppliers of LNG fuel gas supply systems.

2013 /

Thanks to our years of experiences in the marine liquefied gas field, Gloryholder has become the world's professional FGSS supplier

2015 /

Successfully delivered LNG fuel gas system for the world's first low pressure two stroke dual fuel engine.



2008 /

Established worldwide marketing & aftersales service network.

2009 /

Certificated by ISO9000 quality management system.

2012 /

Successfully developed "LGM LNG Fuel Gas System" which has been installed in the two CNOOC's dual fuel tugs.



2000 /

Started the research of fully pressurized LPG carrier and the relevant cargo handling system.

2004 /

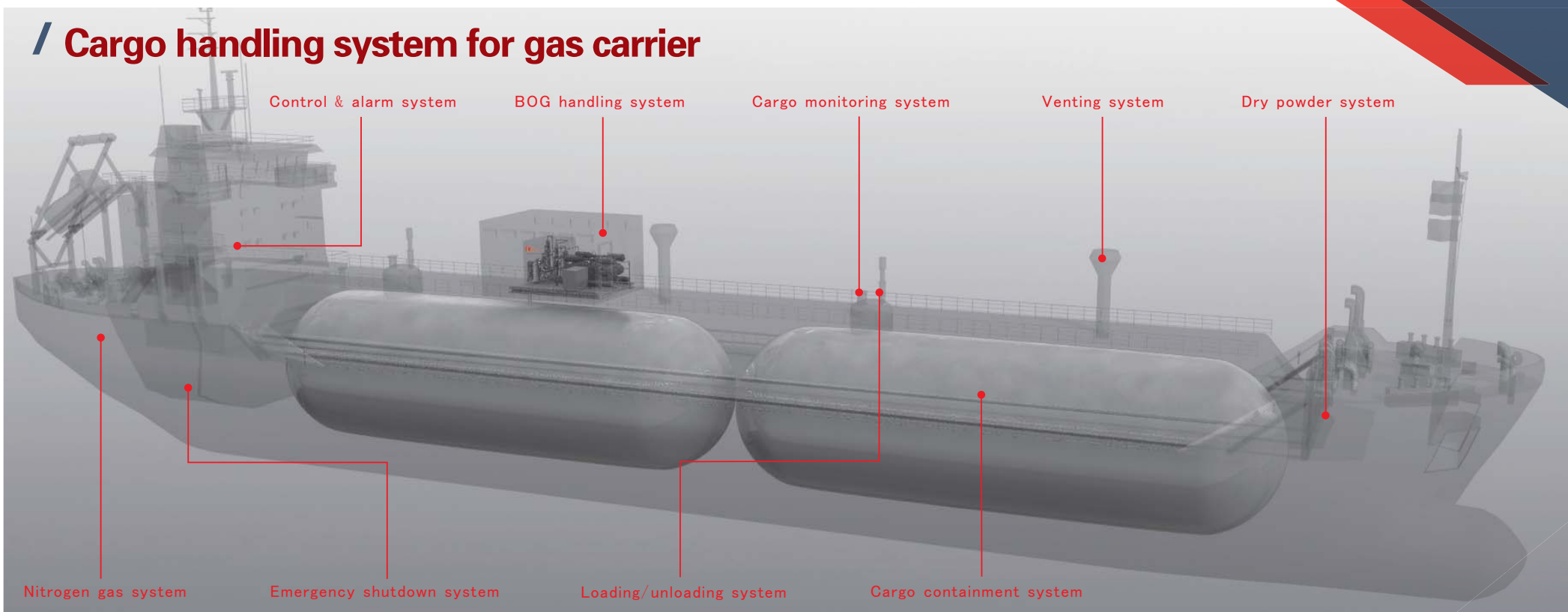
Registered as "Gloryholder Ship Technology Service Co., Ltd." & "Gloryholder Ship Trading HONG KONG Co., Ltd." for providing liquefied gas carrier cargo handling system design, system engineering package and marine equipment agency.

2007 /

Officially registered as "Gloryholder Liquefied Gas Machinery (DL) Co., Ltd." in Dalian Development Zone. The company is specialized in development and supply of cargo containment / handling system for liquefied gas carriers.



/ Cargo handling system for gas carrier



For fully pressurized LPG carrier

Fully pressurized LPG carrier cargo handling system is designed for loading, transporting, and unloading the liquefied petroleum gases (cargoes) at ambient temperature. The system is fitted with Type 'C' tanks fabricated with carbon-manganese steel having a typical design pressure of about 18 barg. Thermal insulation and reliquefaction plant is not necessary for these ships. Cargo loading to the cargo tanks is carried out by the loading facilities of shore bases, and unloading by deep well pumps or cargo compressor.

Cargoes to be handled

- Propylene
- Propane
- Butane
- Butane-Propene mixtures
- Butadiene
- Vinyl chloride monomer(VCM)
- Butylene
- Isoprene and so on.

For semi-pressurized LPG/LEG carrier

Semi-pressurized gas carrier cargo handling system is similar to fully pressurized carrier that they both have type 'C' tanks. Compare to fully pressurized ships, it is possible to reduce tank thickness due to the reduced pressure by cool cargo loaded and/or refrigeration plant and tank insulation. The tanks are usually made from low temperature steels to provide for carriage temperatures of -48°C which temperature is suitable for most LPG and chemical gas cargoes. Alternatively, they can be made from special alloyed steels or aluminum to allow for the carriage of ethylene at -104°C. The ship's cargo handling system is suitable for loading.

- Ethylene
- Ethane
- NH3
- LPG
- Vinyl chloride and so on.

For small scale LNG carrier

Small scale LNG carriers usually have type 'C' tanks with insulation. The tanks are made from low temperature steels to provide for carriage LNG of -162°C. Small scale LNG carriers have flexible cargo handling system. There are several methods to handle boil-off gas.

- Accept a pressure increase during voyage within pressure limit (pressure build-up)
- Burning the vapour gas when emergency
- Utilize the boil-off gas as fuel
- Boil-off gas reliquefaction

Cargoes to be handled:

- LNG
- Ethylene, LPG, VCM and other cargoes for multipurpose gas carriers



/ Cargo/ LNG Fuel Tank

Type “C” Tank

IMO Type C tank is normally cylindrical or spherical pressure vessel having design pressure higher than 2 Barg. It is designed and built to conventional pressure vessel codes, as a result, can be subjected to accurate stress analysis. This type of containment system can be used for fully pressurized, semi-pressurized and fully refrigerated gas carrier and LNG fuel tank. Secondary barrier is not required for type C tank.

- Flexible design pressure
- Loading any kind of cargoes/liquid fuel
- Without secondary barrier.
- Convenient for construction and installation.
- Pressure can be built-up
- Flexible boil off gas handling

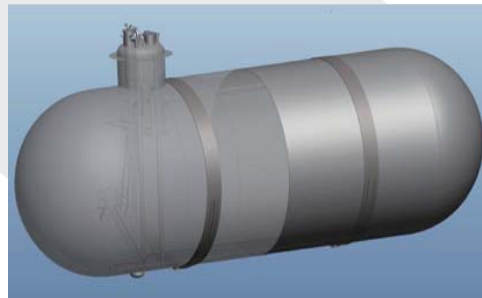
Double Walled Tank



Features &Application

- Vacuum insulation type
- Stainless steel material for inner and outer tank
- Independent support saddle on tank
- Longer pressure holding time
- For small scale gas carrier/ gas fuelled vessel

Single Walled Tank with Insulation

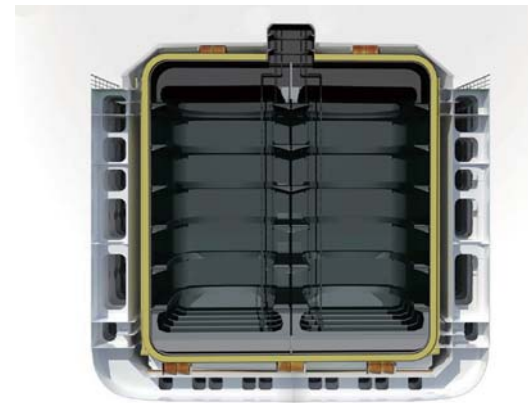


Features &Application

- Covered by insulation layer or insulation panel
- Stainless steel or 9Ni steel material for tank
- Insulation wood between tank's saddle and ship structure
- No bottom penetration
- For large scale gas carrier/ gas fuelled vessel

Type “B” Tank

We had started the R&D on IMO type “B” independent tank since early of 2015. One project team developed special “LGM-B” type independent tank after experiencing technical reserving, system design & optimization. It is fully applicable on fuel storage tank of commercial ships using LNG as fuel and cargo tank of LNG/LPG/LEG carriers. We have been approved in principle for “LGM-B” type independent type tank by DNV-GL in 2016.



Features &Application

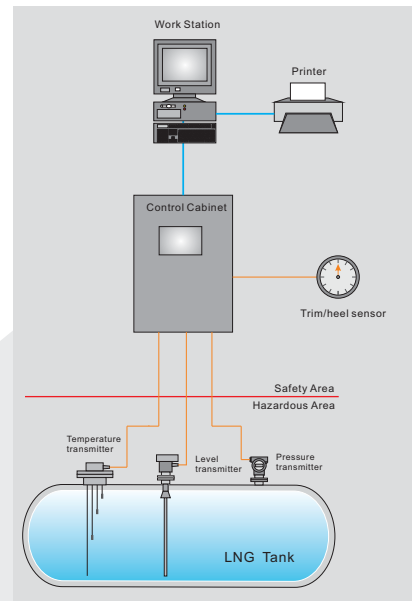
- Independent tank with fully enclosed partial second barrier.
- Potential leaked liquid will be entirely contained inside of secondary barrier.
- Improving dramatically security and economy.
- Unnecessary for replacing the surround ship hull structures by cryogenic resisting material.
- Applicable for fuel gas storage tank of LNG fuel power vessels and the cargo tank of LNG/LPG/LEG carriers

/ Custody Transfer System (CTS)

Gloryholder's LNG custody transfer system provides high accuracy and reliable measurement system for LNG carrier. The system is designed for automatic measurement of LNG tank's level, temperature and vapour pressure. Based on the measured data, CTS system calculates volume of liquefied gas and automatic generates an report on loaded/unloaded or gas amount, which represents the main official commercial document for liquefied gas transportation.

The system consists of

- Tanks Level, temperature, pressure instruments
- Necessary barriers, field bus modules, etc.
- Control Modules
- Work station
- Data logging printer



The system are fully integrated, independent, and failsafe. It can be also used for LNG fuel tank's measurements system. Main advantages as follow:

- With dual radar level gauge, pressure and temperature sensors.
- Data transfer by field bus modules.
- Dual measurement system with redundant control modules
- Primary measurement system in service and secondary system for back-up.
- Reliable and accurate measurements.
- Interfaces for data output to ESD system and cargo monitoring system, etc.

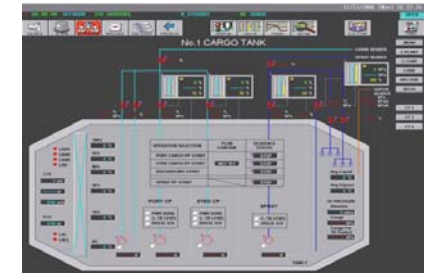


/ Integrated Automation System (IAS)

Gloryholder had developed an Integrated Automation System (IAS) for LNG carrier which provides centralized control and monitoring, emergency alarm and status alarm.

System control function

- Cargo system control
- Automatic sequence control for cargo operation
- Automatic sequence control for ballast operation
- Machinery system control
- Power management system



Process Controller

- Multi-function controller
 - Control loops
 - Logic functions
 - Sequence controls
 - I/O processing
- Redundancy
 - Control module
 - I/O Bus (called X-Bus)
 - I/O module (option)
- Distributed I/O capability (optical fiber cable available)
- Power-on maintenance
- Subsystem integration by serial interface module



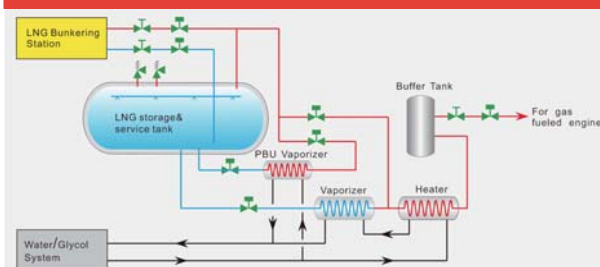
Marine DEO Controller

Open Supervisory Station

- User friendly environment
- Trip cause diagnostic
- Report generation by Microsoft Excel format
- Total Engineering support by RTC
- Environment resistance design for vibration and dust
- Built-in monitoring of processor fan failure
- Pointing device
- Four (4) Level Security
- Various Keyboard
- Redundant Hard Disk Drive

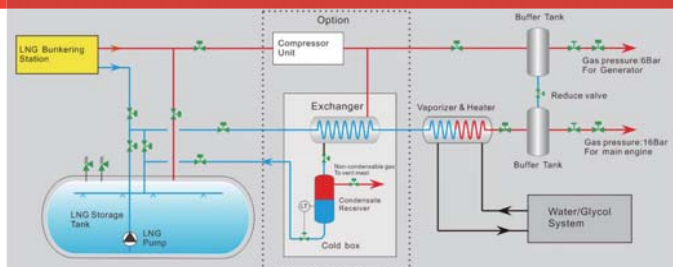


/ LP LNG FUEL GAS SYSTEM



LP FGSS with PBU

- Gas supply pressure less than 10 barg
- Pressure build-up by PBU
- Double wall tank with longer pressure holding time
- Economic & reliable



LP FGSS with LNG Pump

- 6-16 bar of gas supply pressure is suitable for most of engines, except MAN ME/GI main engine.
- Save compressor power consumption compared with 16 barg discharge pressure.
- No non-condensable gas (such as nitrogen gas) ingress into main engine or generator.
- Perfect solution for BOG handling and management.

LNG Bunkering Station

The skid is designed to execute LNG bunkering operation. It is consisted of liquid and vapour piping, necessary valves, instruments and fittings. During bunkering operation, vapour can be returned to shore or consuming as fuel. The bunkering station is designed and fabricated in accordance with OCIMF recommendation.



LNG Fuel Tank

The LNG fuel storage tank is designed for LNG storage on board. They are IMO Type "C" tank with PUF panel and double wall vacuum insulation. The design pressure can be set from 3 to 10 barg. It has significant advantage for arrangement LNG fuel storage on board, such as easy installation, flexible design pressure, low cost of maintenance and no secondary barrier etc.



Water/Glycol Auxiliary System

Water/Glycol mixture solution is used for heating LNG directly. The system is mainly consisted of W/G pump, exchanger, valves and instrument etc. The system is delivered in skid, which is convenient for installation and maintenance.



LNG LP Re-gasification Unit

Fuel gas processing equipments, such as LNG Pump, Vaporizer & Heater, valves and instruments and so on, can be installed in a enclosed process room. It is convenient for ship's arrangement and installation. The process room is with continuous negative ventilation for safety considering.



Control & Monitoring System

New generation control station is designed for integrated remote control, indication and alarm function. It is equipped with CPU redundancy, dual source power and strong communication bridge.

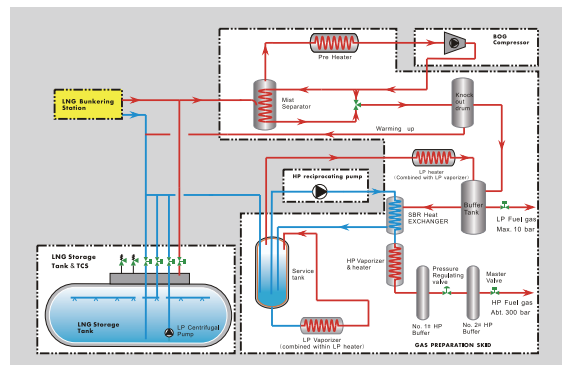




Working Principle

The high pressure fuel gas system is designed for MAN ME-GI engines. The system consists of "B" and/or "C" type storage tanks, BOG compressors, spray pumps, service tank, boost pumps, sleeve tube heat exchangers....

The BOG compressor will be running for supply BOG to generator or boiler at abt. 6bar. Extra BOG, that means BOR larger than consumption rate by generator engines, will be by-passed to service tank through pre-cooling section of sleeve tube heat exchanger for "self-balance reliquefaction". One of spray pumps will be running continuously and supply liquid fuel with abt -160 deg.C to the service tank. The pressure in the service tank is keep at 10 bar and the temperature at abt -130 deg.C. The self-balance reliquefaction only takes place when main engine running and main engine consumption rate is more than 6 times of extra BOR. One of boost pumps is continuously running and supply liquid with 315 bar to sleeve tube exchanger for vaporizing and heating.



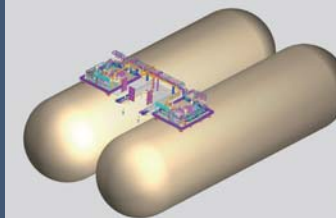
Feature

- Self-balance reliquefaction saves installation cost.
- Sleeve tube heat exchanger make it easy for fabrication and reliable.
- Very low power consumption of the system.
- Simultaneously satisfy the HP main engine and LP auxiliary engine.



Single wall tank

Single wall type LNG fuel storage tank is installed on board after prefabrication on shop. In general, the panel/sprayed PUF layer shall be applied for heat ingress prevention. All tank penetrations including manhole to be arranged on dome which is constructed on the tank top so that no secondary barrier required thanks for it.



HP LNG pump skid

A HP pump unit shall be installed on the downstream of LNG containment for building up sufficient pressure for gas consumer(s) such as ME-GI. LNG transfer pump is usually required to maintain suction pressure.



BOG compressor unit

BOG compressor unit is adopted for boil off gas (BOG) handling. BOG will be drawn from storage tank via suction pre-heater, and feed to gas consumer(s) or reliquefaction plant after compression.



HP /LP gas supply skid

The LNG HP gas heating unit is consist of HP vaporizer and HP heater which to be installed to absorb heat from WG heating cycle for vaporizing those LNG discharged from LNG HP pump and establishing qualified gas feeding condition for gas consumer(s).



FGSS Control Console

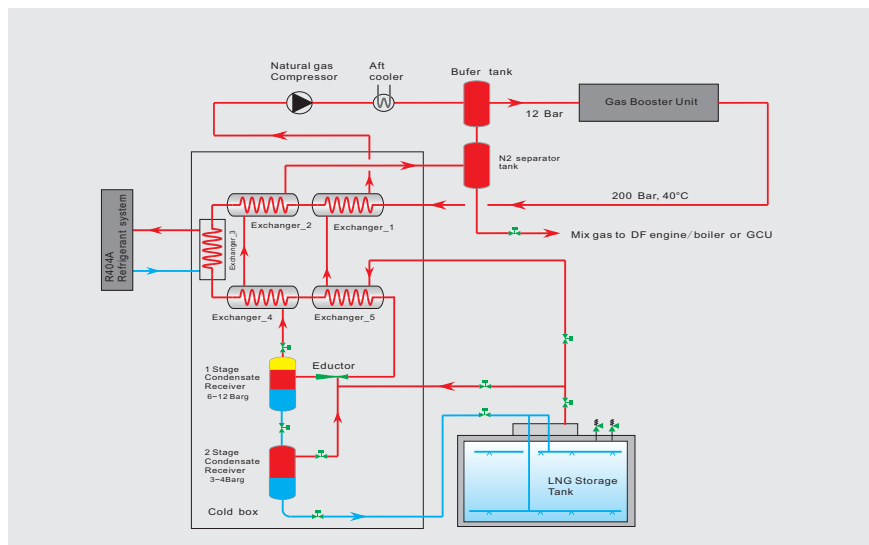
FGSS Control Console is based on a DCS – System. The control, alarm and indication of cargo system will be shown on the graphic display of display screen.

Important safety trips and interlocks will be provided as hard wire fail safe units. These safety trips will be further wired to the DCS – System for additional reset of the system (start – up condition) and alarm monitoring on the display of FGSS control console.





/ HIGH PRESSURE JET RELIQUEFACTION SYSTEM



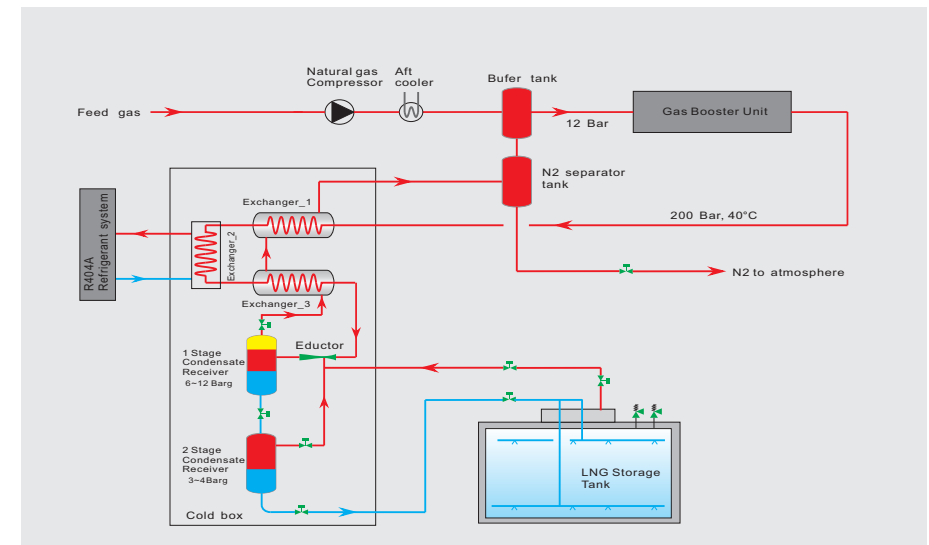
Working Principle

The boil off gas from LNG storage tank will be multistage compressed to above 20MPa, and the compressed gas ingress into the cryogenic cold box, where it will be pre-cooled by the boil off gas from LNG storage tank. Then the high pressure and cryogenic gas will be expanded in the ejector and the mixture of gas and condensate will be generated in the 1st condensate receiver, the condensate will be separated and goes into 2nd condensate receiver and then return to the LNG storage tank. LNG storage tank's boil off gas will be drawn out by the ejector's vacuum nozzle and flow into gas booster compressor for the next compression refrigeration cycle.

Feature:

- Process simply, ejector as main refrigeration parts, safe and reliable, without maintenance.
- Modular design , save installation space.
- Power consumption: Approx: 0.55~ 0.65 KWh/Kg of LNG
- Suitable for medium and small scale LNG carriers and LNG fuel tank's BOG re-liquefied.

/ HP INJECTION LIQUEFACTION SYSTEM



Working Principle

The feed gas will be compressed to around 12bar and led to gas booster unit suction via after -cooler, then the feed gas will be multistage compressed to above 20MPa, and the compressed gas ingress into the cryogenic cold box, where it will be pre-cooled by the boil off gas from LNG storage tank. Then the high pressure and cryogenic gas will be expanded in the ejector and the mixture of gas and condensate will be generated and separated in the condensate receiver, the condensate will be transferred to the LNG storage tank. Boil off gas generated in storage tank will be drawn out by the ejector's vacuum nozzle and flow into gas booster compressor and mixed with feed gas for continuous refrigeration cycle.

Feature

- Process simply, ejector as main refrigeration parts, safe and reliable, without maintenance.
- Modular design , save installation space.
- Power consumption: Approx: 0.6 ~ 0.7 KWh/Kg of LNG.
- Suitable for FLNG

/ REFERENCES

CARGO HANDLING SYSTEM



2006



3500m3 LPG/VCM Carrier
Shipyard: Bohai Shipbuilding Heavy Industry
Volume of cargo tank: 2x1750m3/set
Classification: CCS



2007



3500m3 LPG/VCM Carrier
Shipyard: Zhejiang Haihong Shipyard
Volume of cargo tank: 2x1750m3/set
Classification: CCS



2008



3600m3 LPG/VCM Carrier
Shipyard: Zhejiang Tenglong Shipyard
Volume of cargo tank: 2x1800m3/set
Classification: CCS



2009



3600m3 LPG/VCM Carrier
Shipyard: Yangzhou Kejin Shipyard
Volume of cargo tank: 2x1800m3/set
Classification: NK



2011



5500m3 LPG/VCM Carrier
Shipyard: Guangzhou Hangtong Shipyard
Volume of cargo tank: 2x2755m3/set
Classification: CCS



2017



3940m3 LPG/LEG Carrier
Shipyard: Bangladesh Shipyard
Volume of cargo tank: 2x 1970m3/set
Classification: RINA

FUEL GAS SUPPLY SYSTEM



2013



6500HP Dual Fuel Harbor Tug
Owner: CNOOC
Shipyard: Guangzhou Huangpu Shipbuilding Co., Ltd
Volume of tank: 2x25m3/set



2014



6500HP Pure LNG Fuel Harbor Tug
Owner: CNOOC
Shipyard: Zhenjiang Shipbuilding Co., Ltd
Volume of tank: 2x30m3/set



2015



15K Dual Fuel Chemical Tanker
Owner: Terntank Rederi A/S
Shipyard: AVIC Dingheng Shipyard
Volume of tank: 2x 315m3/set



2016



25k Heavy Lift Bulk Carrier
Owner: ESL Shipping Ltd.
Shipyard: SINOTRANS & CSC JINLING
Volume of tank: 1x390m3/set



2016



16300DWT Chemical Tanker
Owner: Gothia Tanker Alliance
Shipyard: AVIC Dingheng Shipyard
Volume of tank: 2x300m3/set



2017



7,500CEU POST-PANAMAX LNG-PCTC
Owner: Slem Car Carriers
Shipyard: Xiamen Shipbuilding Industry Co., Ltd
Volume of tank: 2x1800m3/set

SUPPORT & SERVICE

- If you have any technical questions or need any requirement support, please contact with our technical department.

tech@gh-lgm.com

- If you need spare part supply, please contact with our sales department directly.

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