

PURIGAS™

Fuel Supply System



... PURIGAS™

PURIGAS™ is the package solution for alternative fuel supply system.

It is named after S&SYS's Ballast Water Management System, PURIMAR™, means PURe and Intelligent GAS storage and supply system.

Since LNG, LPG, Methanol and Ammonia are considered the eco-friendly fuel for IMO's SOx, NOx and GHG emissions restriction, a lot of ship owners are deeply looking into the alternative fuel supply system as best option for this barrier although CAPEX and installation space are heavy obstacles to adapt on board.



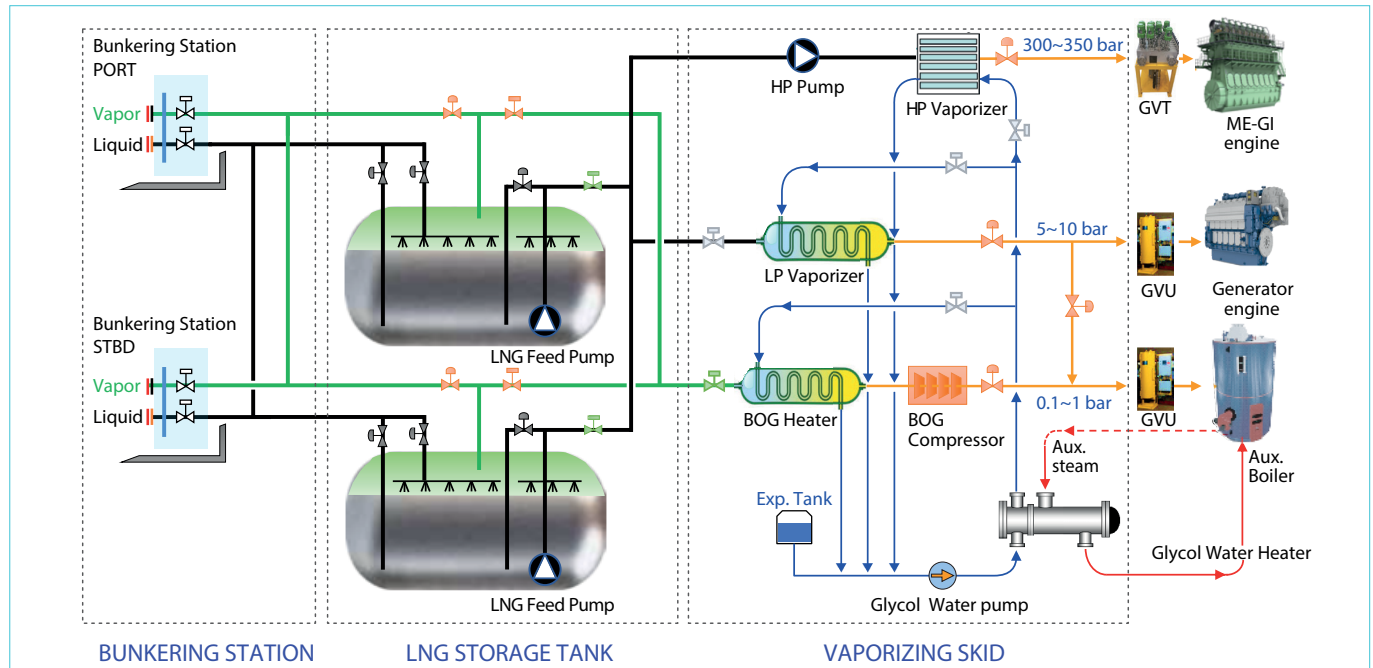
To solve this obstacles, PURIGAS™ has been developed from the accumulated technology and various experiences over past few years. Based on S&SYS's proven technology and know-how, PURIGAS™ will provide the most economical solution and the most reliable package system to our valuable customers with low CAPEX & OPEX in any kinds of fuels LNG, LPG, Methanol and Ammonia.

[Fuel Properties Comparison Table]

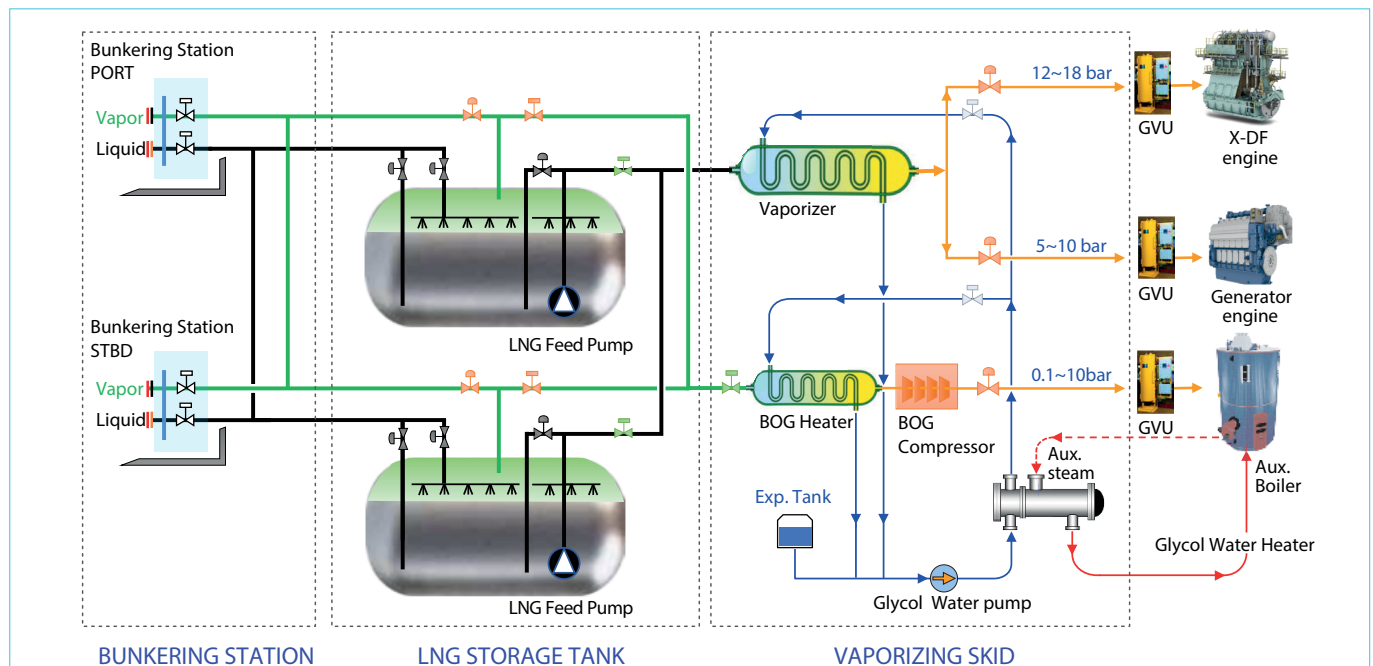
		Marine Gas Oil (MGO)	Liq. Natural Gas (LNG -162°C)	Methanol (CH ₃ -OH)	Liq. Pet. Gas (LPG)	Ammonia (NH ₃)
Specific Energy		42.7 MJ/kg	50.0 MJ/kg	19.9 MJ/kg	46 MJ/kg	18.6 MJ/kg
Density		840 kg/m ³	430~470 kg/m ³	800 kg/m ³	470~590 kg/m ³ (508 at 15°C)	600 kg/m ³
Emission Reduction Compared to HFO Tier II	SO _x	Base	90~99%	90~97%	92%	100%
	NO _x	Base	20~30%	30~50%	84%	Compliant with Regulation
	CO ₂	Base	24%	11%	10 ~ 14%	~ 90% (Using pilot oil)
	PM Particulate Matter	Base	90%	90%	90%	~ 90%
Boiling Temperature		200°C~370°C	- 161°C	64.7°C	- 44°C ~ - 40°C	-33.34°C
Flash Point (Low flash point : < 60°C)		63~87°C	-188°C	11°C	-106 ~ -100°C	132°C
Fuel storage condition		Liquid	Liquid	Liquid	Liquid	Liquid
Storage temperature		25°C	- 162°C	25°C	-32.6°C (at 0.5barg)	-24.7°C (To be discussed)
Supply Pressure		7~8 bar	300 bar	13 bar	50 bar	83 bar
Required Tank Volume		1,000 m ³	1,600 m ³	2,300 m ³	1,500 m ³	3,000 m ³

Fuel Gas Supply System (LNG)

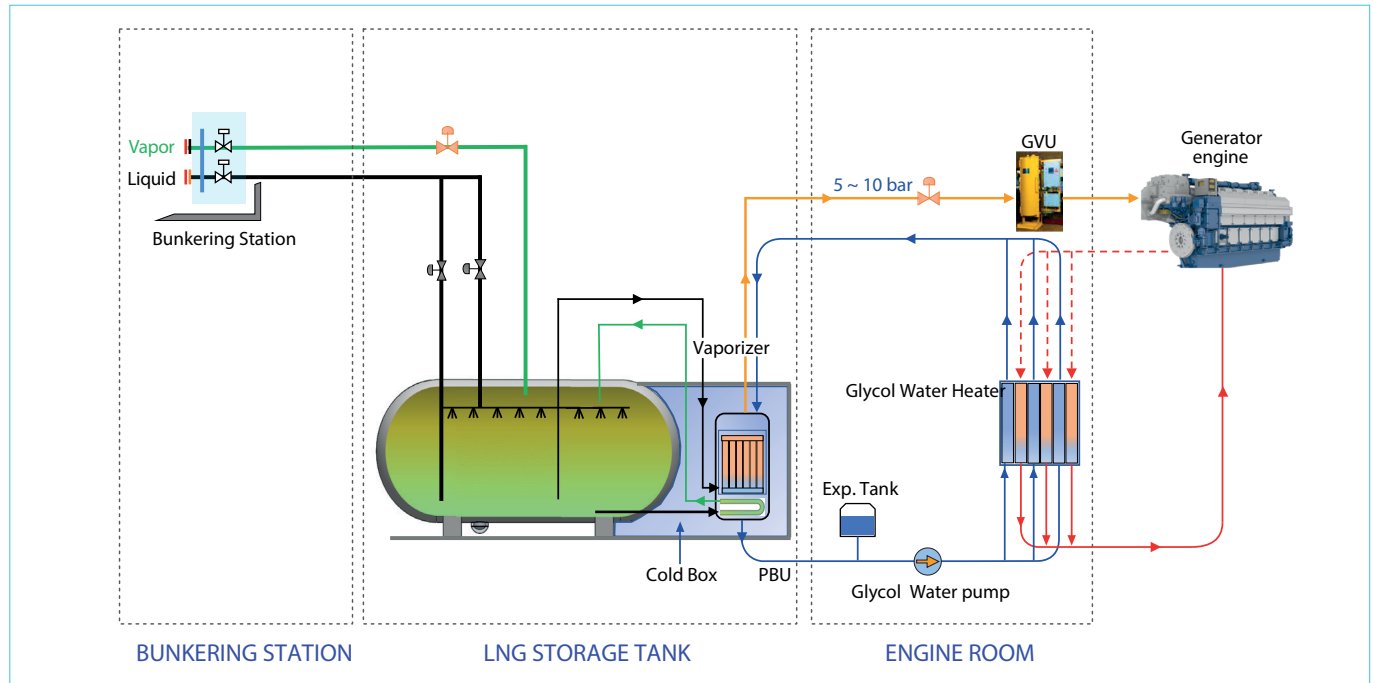
Flow Diagram for ME-GI Engine



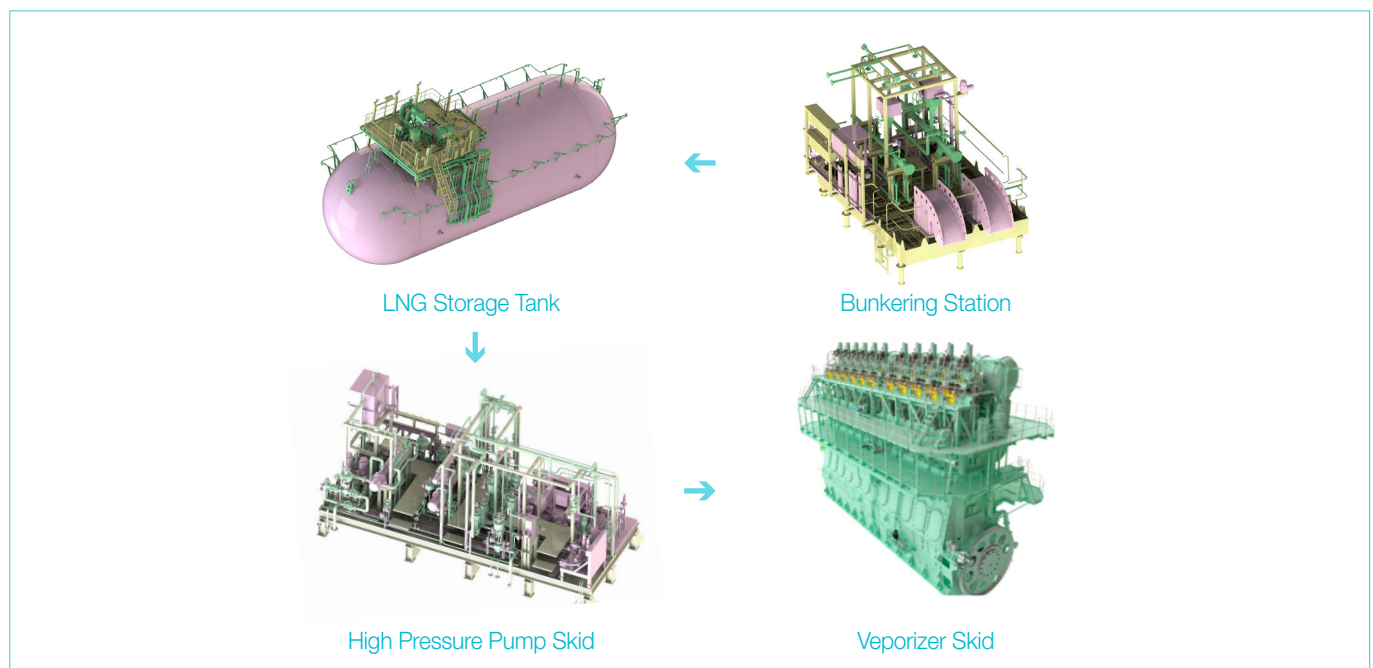
Flow Diagram for X-DF Engine



Flow Diagram for DFDE for Small Vessel



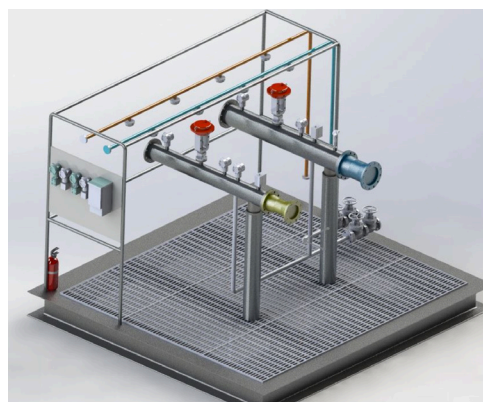
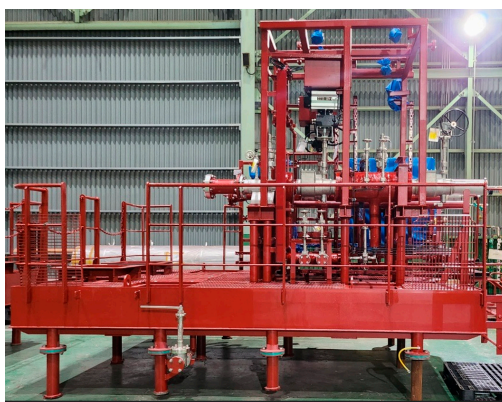
Equipment for PURIGAS™



Fuel Gas Supply System (LNG)

Bunkering Station

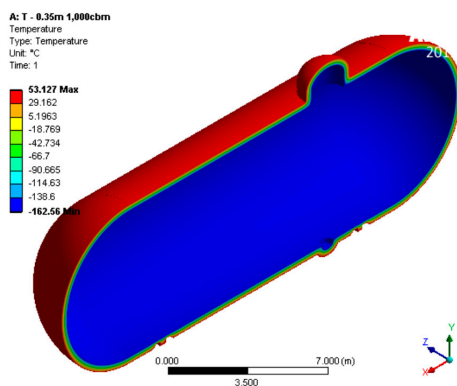
- Quantity : 2 sets(Port & Starboard shipside)
- Liquid Line : 4~8" Pipe
Vapour Line : 4~6" Pipe
- Dimension(In accordance with SGMF guidance)
 - Distance of manifold flanges inboard from ship's side : 1,100mm
 - Horizontal distance Between Flange centers : 1250 mm
 - Vertical distance Between Flange center & working platform : *mm(*depend on ship's specification)



Type-C LNG Storage Tank

Design specification

- Independent Type-C tank(IMO/IGC)
- Single shell(with PUF) or Double shell(VACUUM with Perlite)
- Design pressure : 3~9 bar.G
- Working pressure : 1~9 bar.G



Heat analysis



FGSS SKID

Design Specification

- LNG HP pump unit
- LNG Vaporizer unit
- Glycol water supply system
- BOG compressor (Option)



Vaporizer

PCHE(Printed Circuit Heat Exchanger)type

- Proper for high pressure
- Diffusion Bonded
- Chemically etched fluid channels

Merit

- Minimize area and size of heat exchange
- Maximize heat transfer efficiency

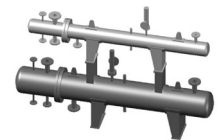


Shell & Tube Heat Exchanger type

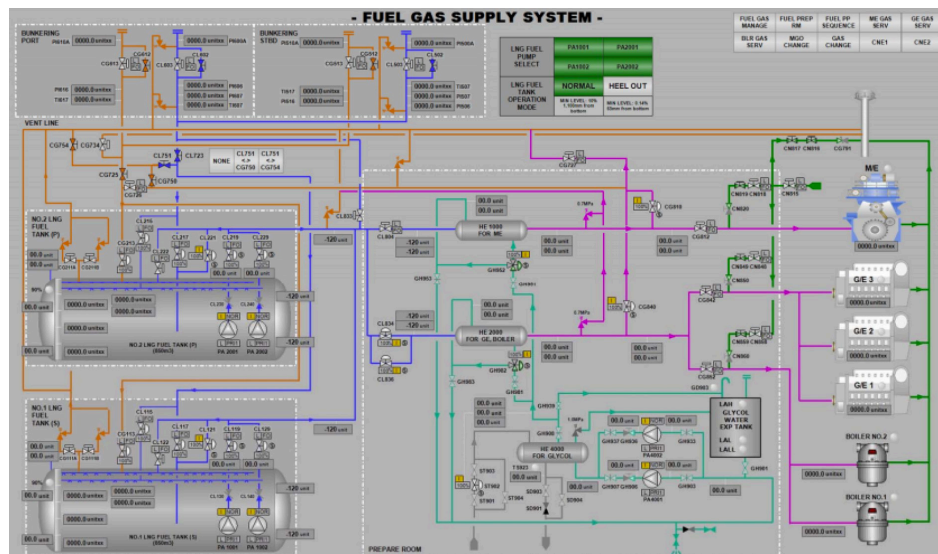
- Proper for low pressure
- Most commonly used

Merit

- Low cost
- Easy maintenance

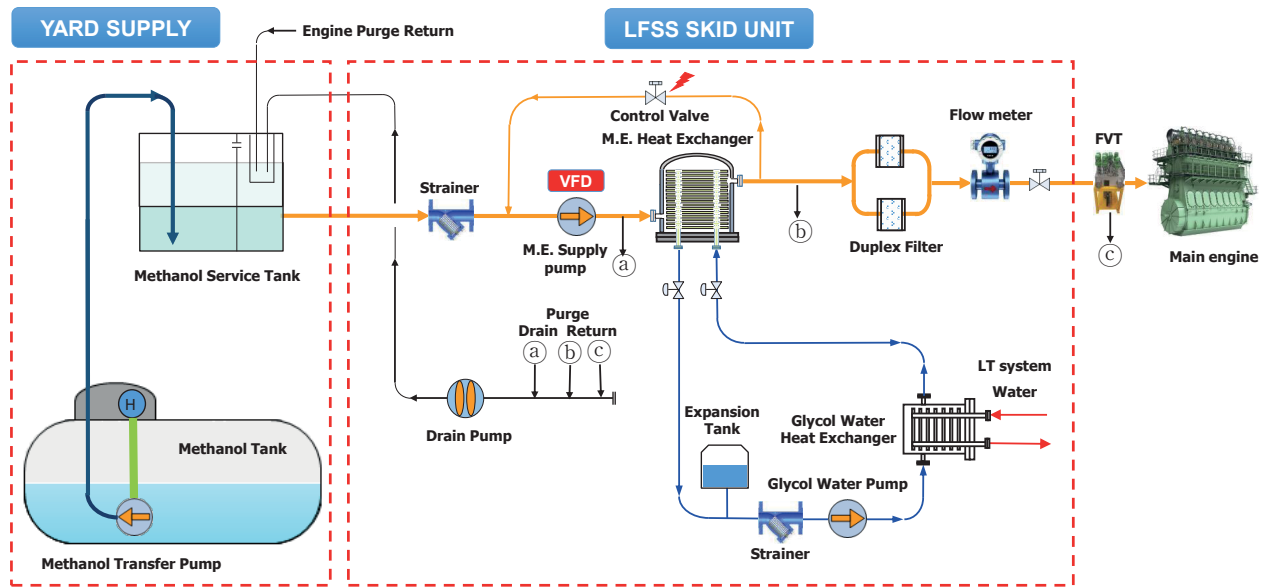


FGSS Control & Monitoring Mimic (SSAS-MASTER)

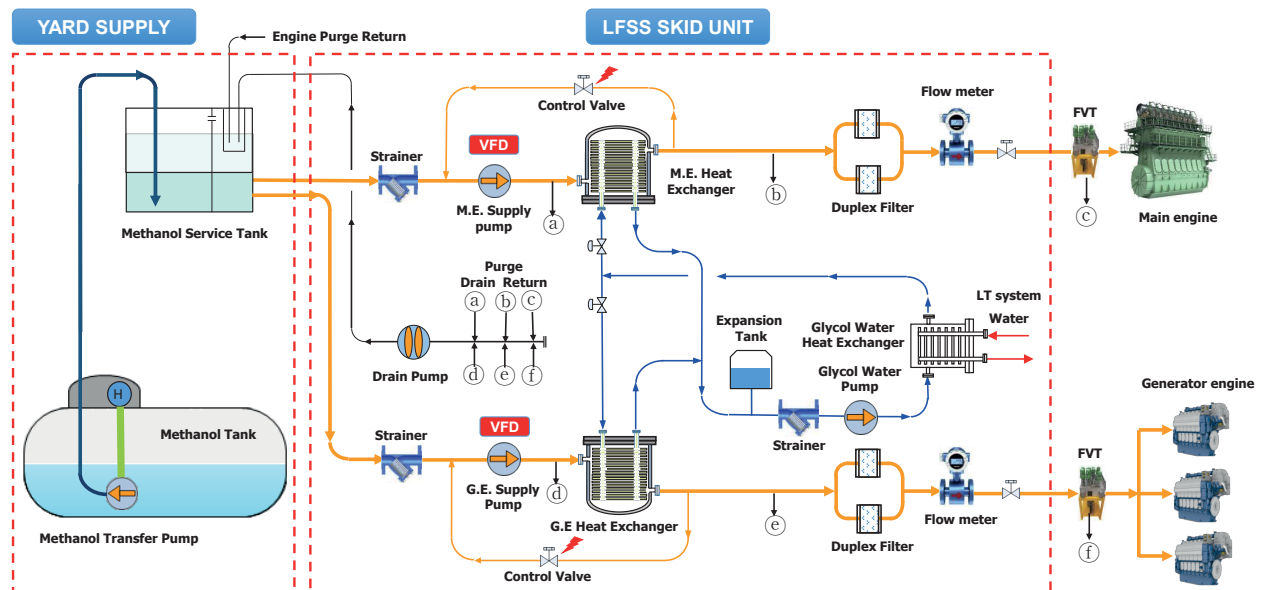


Low flashpoint Fuel Supply System (METHANOL)

Flow Diagram for Main Engine



Flow Diagram for Main Engine and Generator



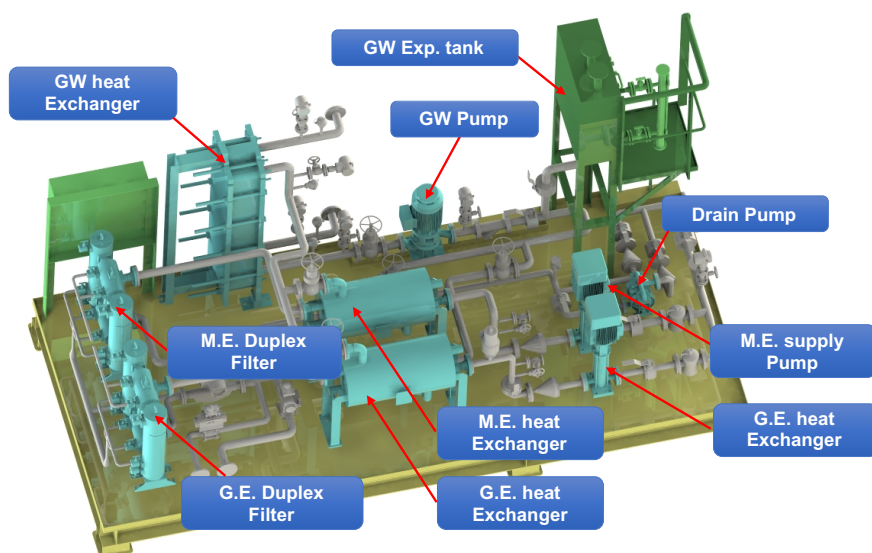
Low flashpoint Fuel Supply System (METHANOL)

LFSS SKID UNIT for Main Engine and Generator

LFSS SKID

Design Specification

- Me-OH supply pump
- Drain pump
- Me-OH heat exchanger
- Me-OH duplex filter
- Glycol water pump
- Glycol water heat exchanger
- Glycol water expansion tank
- Control/Manual valve
- Instruments



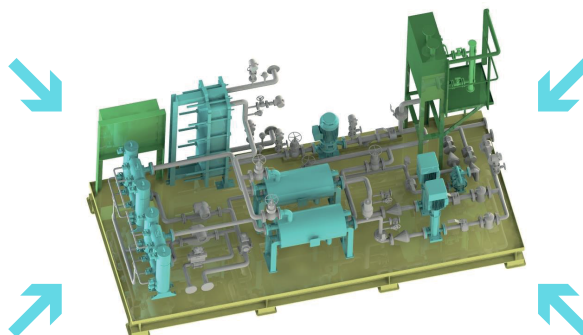
Equipment for LFSS



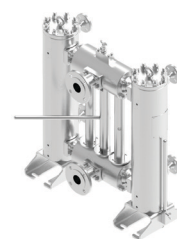
Methanol Pump
Magnetic drive type



Methanol Heat Exchanger
Shell & Plate type



LFSS SKID UNIT

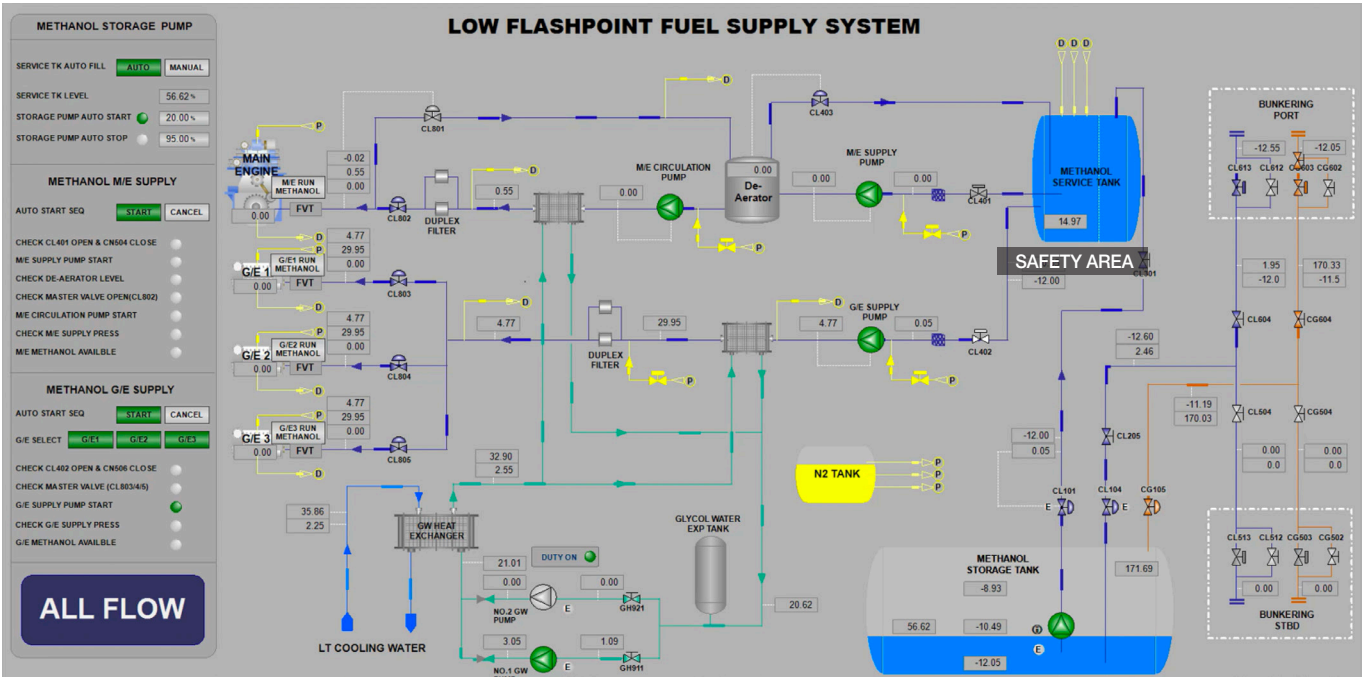


Methanol Filter
Duplex filter, 10 micron



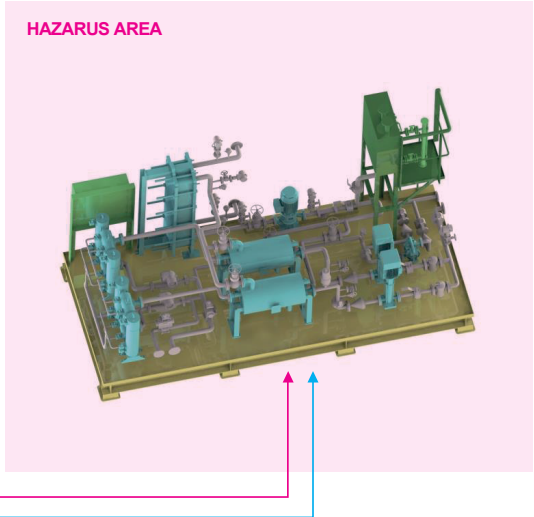
Methanol Flowmeter
Coriolis mass flow type

LFSS Control & Monitoring Mimic (SSAS-MASTER)



LFSS CONTROL SYSTEM

LFSS SKID UNIT

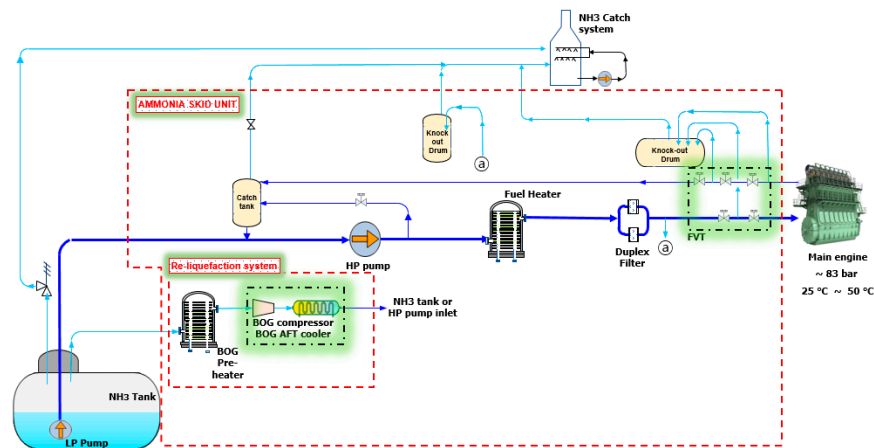


- S&SYS automation system will be applied for LFSS to optimize whole LFSS system.

OTHER Fuel Supply System (AMMONIA, LPG)

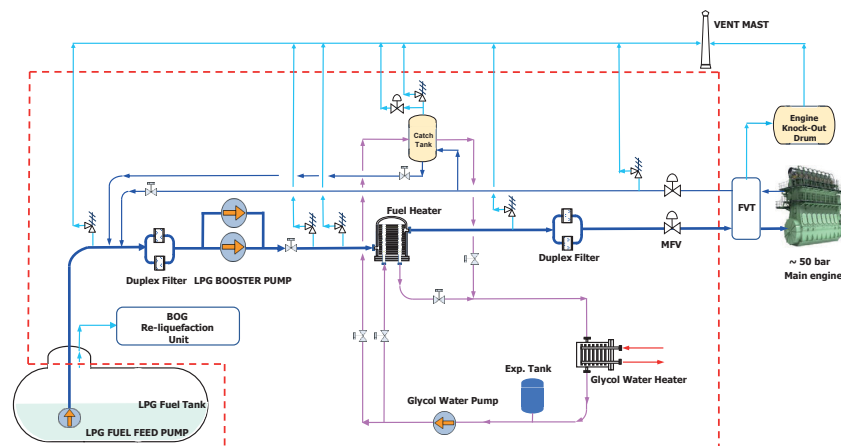
Flow Diagram for AMMONIA

- Demand from governments and stakeholders around the world for the carbon-free fuel is widely growing, and ammonia seems likely to be a next alternative fuel.
- The Ammonia fuel supply system is being developed based on the technology of the LNG & Methanol fuel supply system.












Flow Diagram for LPG

- Liquefied Petroleum Gas (short as LPG) fuel supply system has been developed from the accumulated technology for other related fuel supply system (LNG, Methanol) and engineering capability of S&SYS.
- PURIGAS™- LPG fuel supply system will provide the most economical solution and the most reliable package system to our valuable customer with low CAPEX & OPEX in ME-LGIP engine.





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KOREA	STK Engineering Co.,Ltd.	JAPAN	 Tsuneishi Co.,Ltd.	SOUTH AMERICA	
KOREA	JEWON Engineering Co.,Ltd.	JAPAN	 Union.Co.,Ltd.	BRAZIL	METALOCK Brazil Ltd.
KOREA	STA	SINGAPORE	CWH Engineering	BRAZIL	DZETA Marine & Offshore
KOREA	DEX	SINGAPORE	Urecon Automation Pte. Ltd.	EUROPE	
CHINA	Seven Seas Electronic Co.,Ltd.(Shanghai)	SINGAPORE	 Mitsui & Co (Asia Pacific)	GERMANY	Mare systems
CHINA	Seven Seas Electronic Co.,Ltd.(Qingdao)	TAIWAN	 YL Maritime Co.,Ltd.	ITALY	MASTER CONTROL
CHINA	Seven Seas Electronic Co.,Ltd.(Dalian)	CENTRAL AMERICA		GREECE	 D.C.S.I Ltd.
CHINA	SAMSUN Marine Technology(HK) Co.,Ltd.	MIDDLE EAST		TURKEY	Oceanist
CHINA	 Health Lead Development Co.,Ltd.	NORTH AMERICA		AFRICA	
CHINA	 SJE Engineering Co.,Ltd.	PANAMA	PASRAS S.A	Nigeria	Radial Circle
CHINA	SSMT				
INDIA	 Indostan Corporation	U.A.E	MARITRONICS		
JAPAN	 Orient Marine Co.,Ltd.	USA	MarineBCTec(LA)		
		USA	MarineBCTec(NJ)		

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