

Cryogenic Heat Exchanger and System Engineering **Global Leader**



**‘World Class Company’
with Heat Transfer Technology**

- Company Name DongHwa Entec Co.,Ltd.
- CEO Kim Dong Kun
- Company Size Mid-sized Businesses
- Type of Business Manufacturing industry(2011)
- Establishment Dec.1980



Noksan Office and Factory



Hwajeon Office and Factory



R&D Center

Since its foundation in 1980, DongHwa Entec has been specializing in manufacturing a wide range of heat-exchangers, from marine heat-exchanger repairing service to heat-exchangers for power-generation and plant industry. Currently, we are heading into new arena of special heat-exchanger for LNG liquefaction & gasification plant. Besides domestic market, we also successfully diversified overseas business in Southeast Asia, Middle-East and Europe. Subsequently, we generated more than 80% of sales in abroad, and today we have become the leading heat-exchanger manufacturer in Korea. We keep the slogan “Once be customer, always be customer” in our mind. In a preparation for our future success, DongHwa Entec places top priority on “customer” as an external determinant. We will exert ourselves to fulfill customer’s “needs”, touch customer’s heart and keep in tune with customer throughout manufacturing, delivery and follow-up service of all products.

DongHwa Entec

Donghwa Entec Co.,Ltd

Noksan Office and Factory

7, Noksansandan 261-ro, Gangseo-gu, Busan, Korea
T. +82-51-970-1000 F. +82-51-970-1001

Hwajeon Office and Factory

20, Hwajeonsandan 1-ro 63beon-gil, Gangseo-gu, Busan, Korea
T. +82-51-970-1100 F. +82-51-970-0710

Energy-Environmental Technology Laboratory

7, Gwahaksandan-ro 305beon-gil, Gangseo-gu, Busan, Korea
T. +82-51-970-0711 F. +82-51-970-0730

DongHwa Entec (Shanghai) Co., Ltd.

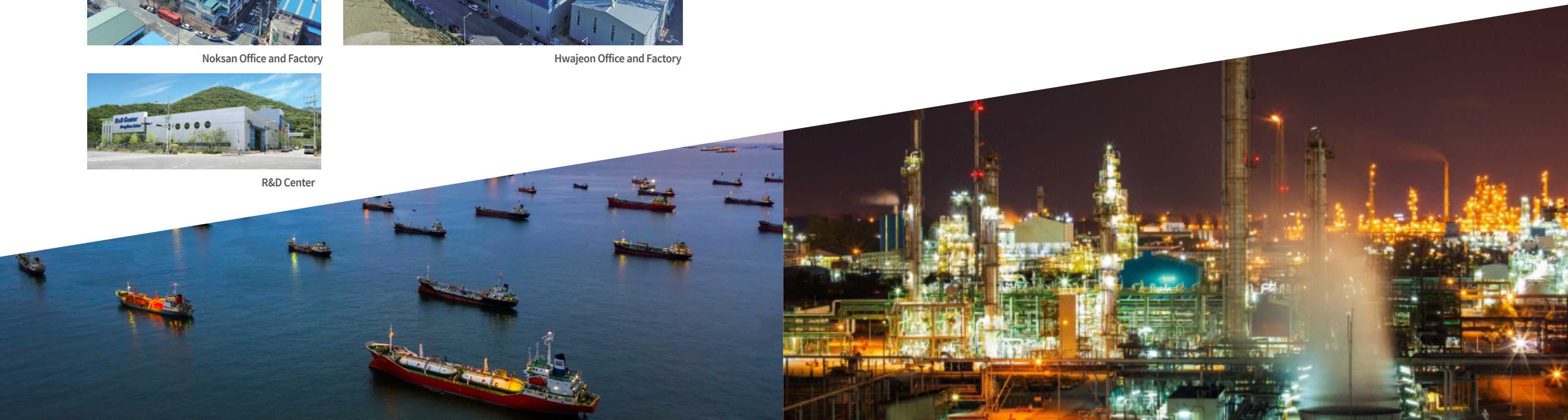
No.2508 Jiangshan Road Lingang New City Shanghai China 201308
TEL : +86 (0)21-5197-5001 FAX : +86 (0)21-5197-5005



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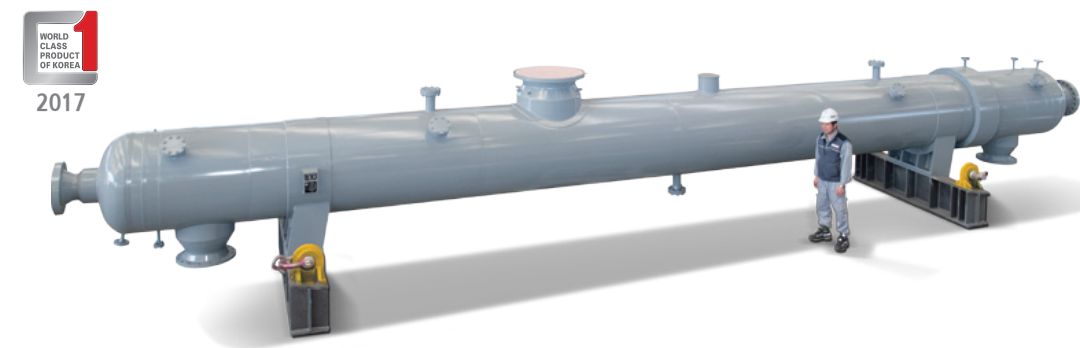
➤ **World Class Product of Korea**



HP/LNG Vaporizer

As an ultralow temperature heat exchanger used to load/unload the LNG from the LNG FSRU, the equipment plays a role in gasifying the high-pressure LNG. The heat source that heats the LNG uses fluid usable in seawater, glycol water, and other low temperature environments, and the optimal design suitable for the fluid characteristics is implemented.

The ability to analyze the heat characteristics of high pressure and extreme temperature and structure design technology are the core of the technology, and the equipment has been selected as a world class product. Depending on the system features, a trim heater is installed at the rear end of the Hp vaporizer and it is used for temperature compensation and responds to the changes in the loading/unloading conditions. If the equipment is used in connection with our LNG trim heater, plate cooler, steam heater, and glycol heating system, the best system efficiency and effective operability can be achieved.

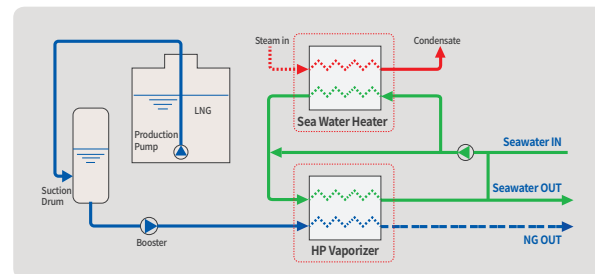


○ LNG RV/FSRU Regasification System

Sea water direct heating

Combined open/closed loop with seawater and steam heating

- Min. equipment
- Control simple
- Min. Energy consumption
- High pressure vaporizer : Shell and Tube type heat exchanger



○ Other Application

A. LNGC Cargo Handling System Low Pressure Vaporizer

- Design temp. : -190degC / Desing Pressure 10 bar

B. Fuel Gas Supply System for ME-GI Engine

- Design temp. : -190degC / Desing Pressure 330 bar



Energy Saving System (ESS)

ESS (energy saving system) is an intelligent control system to optimize the ship's central seawater cooling system (CSCS). The ESS monitors marine environment conditions during the ship's navigation, and it efficiently manages the operation of the CSCS pump.

If ESS is used in combination with Donghwa Entec's plate cooler, the innovative energy saving of the CSCS is implemented. ESS can be applied to various motors and pumps used on a ship, and energy efficiency can be improved according to the environmental conditions through professional technical support.

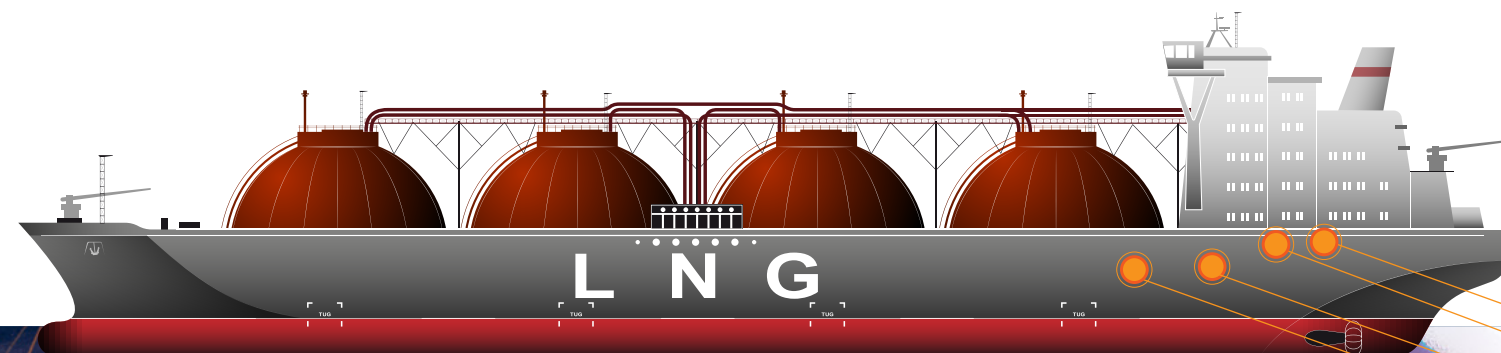
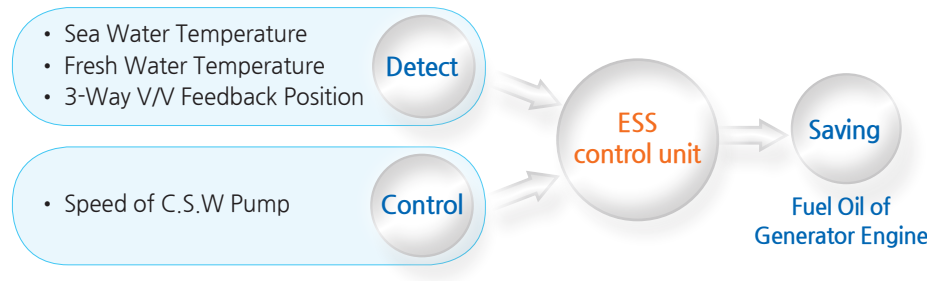
○ Operating Principle

- 1) C.S.W PUMP : Monitoring temperature of sea water, low temperature of fresh water and the position of 3-way valve.
- 2) F.W PUMP : Controlling by F.W. inlet's T/T of Central Cooler and pump's P/T
- 3) E/R VENTILATION FAN : Step controlling by under M/E load. In addition, by detecting inlet's high temp and negative pressure in engine room, helps the ship to adequately sail.
- 4) CARGO HOLD FAN : Controlling by checking temp of cargo room.



The advantage of ESS

- High energy saving rate up to 40%
- CO2 Reduction according to Save fuel oil(DO, HFO)
- Automatic flushing
 - Anti-fouling
 - Adjust flushing timing
- Stability of system
 - Set the minimum flow-rate
- Continuous operation variable pump speed control
- Reduction in the start current



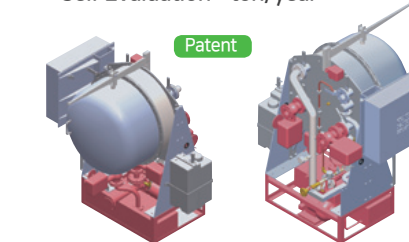
Fresh Water Generator

The FWG (fresh water generator) is a device that makes the required fresh water on a ship from seawater using low pressured evaporation, and it was designated as a world class product. The seawater evaporation heat source includes jacket water (waste heat source after engine cooling), or steam. By using the water ejector, the inside of the chamber is maintained in a vacuum state.

Depending on the heater changer type used for seawater evaporation and condensing process, the FWG is divided into the plate type and the S&T type, and the model is classified according to the amount of fresh water required on a ship. There are 20t, 25t, 30t, 35t, and 40t/d models, and an individual design is possible, if necessary. We provide a higher level FWG operating system through a necessary performance value controlling system that measures fresh water's salt concentration, and self-cleaning system, and an alarm system notices when parts need replacing.

○ Feature

- Self Cleaning - 7hr/1hr
- Self Diagnosis - 10ppm
- Self Flushing - 90minutis
- Self Evaluation - ton/year



○ Two concept of Smart FWG v1.0

The difference between the two types depends on the cleaning water supply method.

Model S1 :

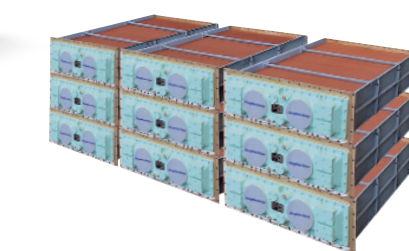
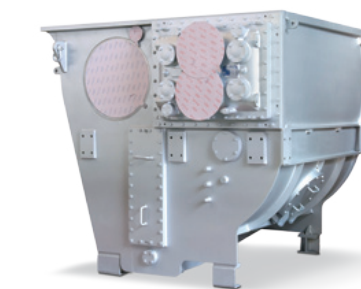
Standalone Smart FWG
- Supplied self cleaning system

Model W1 :

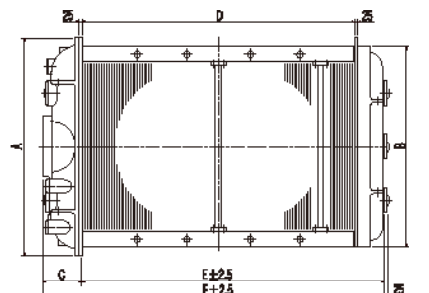
Water-Filling Smart FWG
- Supplied fresh water tank

Air Cooler

Since its establishment in 1980, Donghwa Entec has been supplying air coolers used for low and high speed engines, and our air cooler was selected as a world class product. The engine's combustion efficiency can be improved by supplying more compressed air by cooling the compressed air supplied through a turbo charger. Based on our air cooler technology for ship engines, the air cooler is also used for EGR equipment, a NOX (a discharged gas from a ship) reduction equipment.



3-Cartridge Air Cooler for 12K90 MC Main Engine



World Class Product

- HP/LNG VAPORIZER
- Energy Saving System (ESS)
- Fresh Water Generator
- Air Cooler