ISO 9001 Certificate No. A 0858
ISO 14001 Certificate No. B 0110
OHSAS 18001 Certificate No. C 0082
AS9100 Certificate No. FM568558
WORLD CLASS 300

40th ANNIVERSARY 1980-2020

DongHwa Entec

HEAT EXCHANGER FOR ONSHORE BUSINESS



CONTENTS

04 DONGHWA ENTEC FOR PLANT

06 PRODUCTION RANGE

08 APPLICATION FOR STEAM TURBINE

11 APPLICATION FOR GAS TURBINE

14 APPLICATION FOR COMPRESSOR

17 APPLICATION FOR POWER GENERATION

20 QUALITY CERTIFICATIONS

22 SALES A/S NETWORK & MAIN CUSTOMER

GLOBAL LEADER

Cryogenic Heat Exchanger &
System Engineering



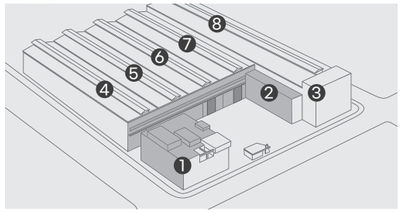
DONGHWA ENTEC FOR PLANT

화전공장
Hwajeon Factory

주소 부산시 강서구 화전산단 1로 63번길 20
준공 2013년 11월
공장규모 대지면적: 20,127m² (6,088평)/건축 연면적: 20,087m² (6,076평)

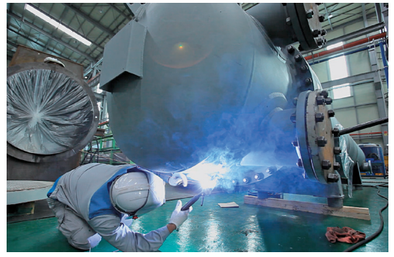
Adress: 20, Hwajeonsandan-1-ro 63Beon-gil, Gangseo-gu, Busan, Korea
Completion: Nov. 2013
Factory Scale: Plant Size: 20,127m² (6,088평) / Building Size: 20,087m² (6,076평)





① 사무동 Office Work ② 복지동 Welfare Center
③ 1Bay(A/B) ④ 1Bay(C/D) ⑤ 2Bay(E/F) ⑥ 3Bay(G/H)
⑦ 4Bay(I/J) ⑧ 5Bay(K/L)





(주)동화엔텍은 발전, 석유화학 플랜트 등의 열회수와 회전기기(Turbine, Compressor)에 필수적인 열교환기를 자체 설계, 제작, 납품, 사후관리에 이르기까지 One Stop Service를 제공하고 있습니다. 진공 관련 기술과 FinTube(핀튜브) 관련 기술을 이용하여 Surface Condenser, Ejector Condenser, Gland Condenser, Inter/After Cooler, Turbine Cooling Air Cooler, Fuel Gas Heater등 다양한 제품을 통해 기술 축적은 물론, 제품의 국산화에 최선을 다하고 있습니다.

DongHwa Entec provides a one stop heat exchangers service that is essential for heat collections and rotating equipment (turbine and compressor) in power generation and petrochemical plants ranging from the design, manufacture, and delivery to the follow up management. Using the vacuum technology and fintube technology, we are doing our utmost to achieve product localization, as well as a technological accumulation through various products including a surface condenser, an ejector condenser, a gland condenser, an inter/after cooler, a turbine cooling air cooler, and a fuel gas heater.



Production Range

(주)동화엔텍은 석유화학공업, 발전설비, 방직공장 그리고 식품산업 등의 열회수와 효율적인 설비로 사용되는 모든 종류의 열교환기를 자체 생산하고 있습니다. 특히 대형 회전기기용 열교환기에 많은 실적을 가지고 있으며, 유수 엔지니어링사와 중공업으로 부터 견적을 제출하고 주문품을 제작, 납품하고 있습니다.

DongHwa Entec is producing all kinds of heat-exchanger in our factory which are efficient facility and heat-recovery such as the petro-chemical industry, generating unit, textile factory and food industry. In particular, we have a great record on heat exchanger for large rotation equipments, and submit an estimate from oil-water engineering and heavy industry and then delivery of manufactured goods.

Application for Steam turbine


Surface Condenser


Ejector Condenser


Gland Condenser

Application for Gas turbine


Fuel Gas Heater


Fuel Gas Heater After Cooler


Turbine Cooling Air Cooler

Application for Compressor


After Cooler


Inter Cooler


Lube Oil Cooler

Application for Power Generation


Closed Cooling Water Cooler (CCW)


Deaerator


Ejector Vacuum System

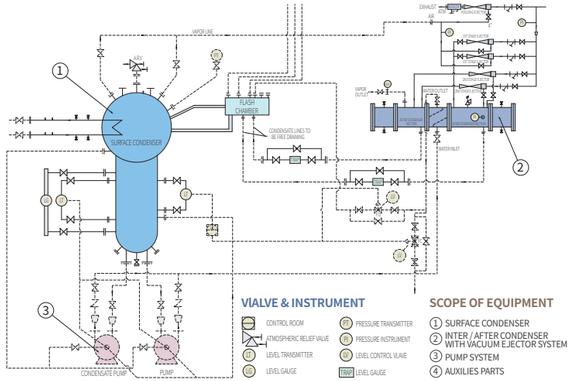

Feed water Heater (HP/LP)

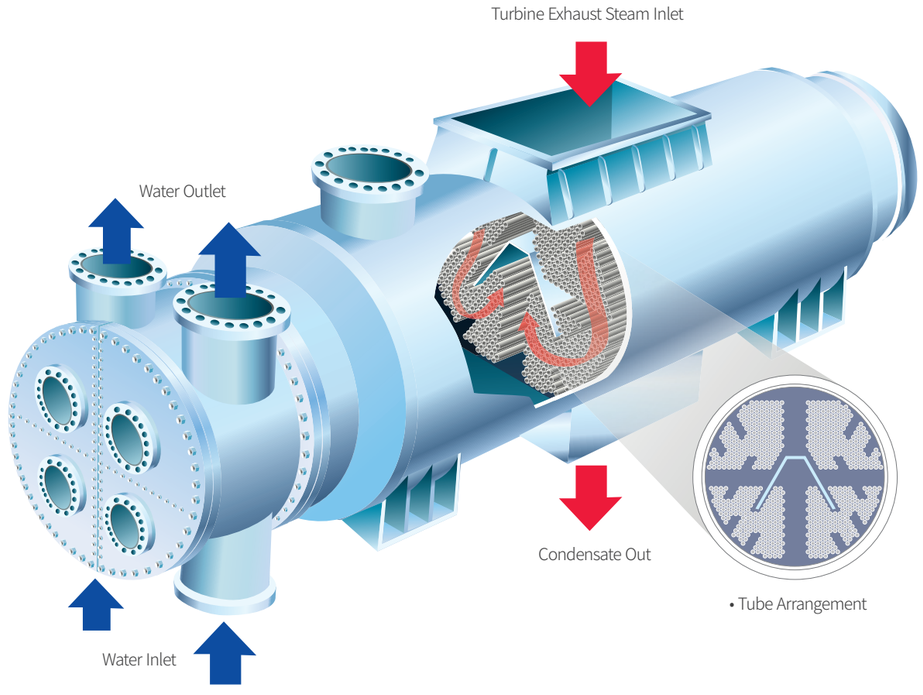
APPLICATION FOR STEAM TURBINE

Surface Condenser

복수기는 발전소의 발전기 구동용, 화학공장의 컴프레셔 구동용, LNG선의 추진용 등 산업전반에 사용되는 증기터빈의 후단에서 진공배압을 형성하여 터빈의 출력을 보증하며 터빈을 구동한 폐증기를 응축시키는 열교환기입니다. 여기서 응축된 물은 일반적으로 급수펌프, 급수가열기 그리고 탈기기를 거쳐 보일러로 재순환됩니다. 터빈과의 위치에 따라 Top Entry Type, Side Entry Type이 있으며 소형, 중형사이즈는 원형 복수기가 사용되며 발전소용 등 큰 사이즈는 사각형 복수기가 사용됩니다.

Surface Condenser Package





The surface condenser is a heat exchanger that forms a vacuum back pressure at the rear end of a steam turbine used in many industries including generator operation in power stations, compressor operations in chemical factories, and the LNG ship propulsion. It ensures the turbine output and condenses the waste steam that operates the turbine. The condensed water here is recirculated to the boiler through a water supply pump, water supply heater, and deaerator. There is a top entry type and a side entry type depending on the position from the turbine. For small and medium sized power plants, the circular condenser is used, and the square condenser is used for big power plants.

Product Feature

- **Design Code**

  For Plant
  - ASME Code
  - European PED
  - China SELO
  - API Code
  - Korea KGS / KOSHA
  - Japan KHK / JPVC / MHLW
  - TEMA R,C and B
  - Russian GOST
  - ALL CLASS
  - Others Country Local Code (Algeria, Singapore, ...)

  For Marine Plant
  - All nation's Code including ABS, LR, DNV, GL, BV, KR, NK, RINA

- **Applicable Material**
  - Titanium Stainless Steel, Cu-Alloy, 904L, C.S

- **Max. Manufacturing Condition**
  - Weight: 400ton







APPLICATION FOR STEAM TURBINE

Ejector Condenser

Vacuum Steam Condenser 내 진공 상태를 유지하도록 일정하게 공기를 추출하기 위한 스팀으로 운전되는 Ejector와 사용된 스팀을 응축시켜 재사용하기 위한 Condenser를 결합한 열교환기입니다.

Steam Turbine용 Vacuum Steam Condenser의 경우 공기가 유입되면 튜브의 표면을 감싸게 되어 열 전달 효율을 떨어뜨리고 복수기의 진공이 깨어지게 되는데 이는 결과적으로 터빈의 효율을 감소시키게 됩니다.

따라서 Steam Ejector가 Condenser에서 공기를 추출하기 위해 사용되며, 응축기는 냉각수를 사용하여 공기와 함께 나가는 증기를 회수하기 위한 것으로 사용됩니다. 이 응축수는 주로 재사용과 효율을 위해 스팀 트랩을 통해 복수기로 다시 보내지며 일반적으로 Ejector Vacuum System은 1단 이젝터와 중간응축기 그리고 2단 이젝터와 최종 응축기로 이루어져 있어 회전기기가 들어가지 않으므로 유지, 보수가 쉬운 장점이 있습니다.

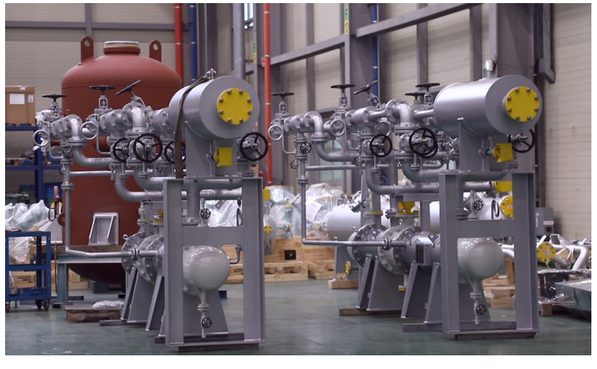
A heat exchanger that combines an ejector operated with steam that constantly extracts air to maintain a vacuum state within the vacuum steam condenser and the condenser to reuse the steam by condensing it.

The vacuum steam condenser for steam turbine reduces heat delivery efficiency as air covers the tube surface if air comes in, and so the vacuum of the condenser breaks, resulting in the decrease of turbine efficiency.

Therefore, the steam ejector is used to extract air from the condenser, and the condenser is used to collect steam when it escapes with the air by using the cooling water. The condensed water is sent back to the condenser through a steam trap for reuse and efficiency improvement. The ejector vacuum system consists of a one-layer ejector, interim condenser, two-layer ejector, and final condenser. So, no rotating equipment is installed, and maintenance/repair is easy.







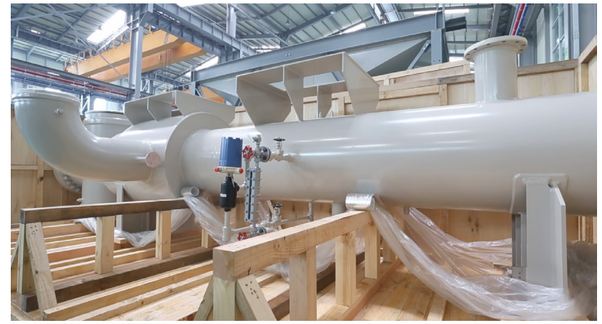
Gland Condenser

스팀 터빈의 경우 고온 고압 스팀이 터빈을 회전시키고, 이를 통해 열에너지를 운동에너지로 교환하는 장치인데, 스팀 터빈 내부의 증기가 외부로 유출되거나, 외부 공기의 유입을 방지하기 위하여 Seal Steam System이 필요합니다.

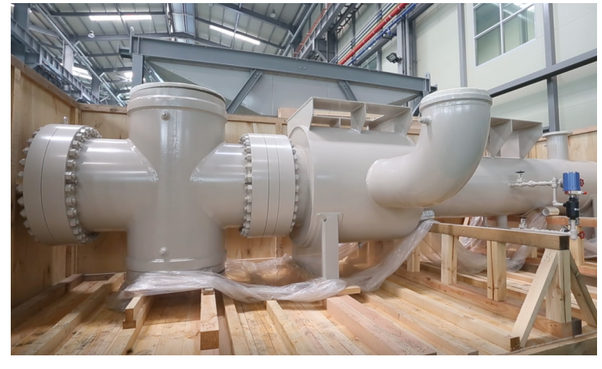
이러한 Seal Steam System내부에 스팀의 열량 및 응축수를 회수하고 진공을 형성하여 Condenser로 스팀의 배출을 용이하도록 하는 열교환기가 Gland Condenser입니다.

A heat exchanger that collects steam and condensed water used for sealing in a steam turbine, forming a vacuum, and making steam discharge easy. In a steam turbine, the high temperature and the steam pressure rotates a turbine, and the turbine turns the heat energy into motion energy.

To prevent steam within the steam turbine from leaking air or to prevent external air from getting in, a seal steam system is necessary. The gland condenser is the heat exchange that collects steam and condensed water within the seal system, forming a vacuum, and making steam discharge into the condenser.







APPLICATION FOR GAS TURBINE

Fuel Gas Heater

가스터빈은 고온, 고압의 연료가스의 열에너지로 터빈의 날개를 회전시킨 에너지로 동력을 발생시킵니다. Fuel Gas Heater는 이러한 연료가스의 열에너지를 높이기 위해 연료가스의 온도를 상승시키는 열교환기입니다. TEMA 'BFU' Type (Low-Finned U-tube Type)으로 적용됩니다. 고압운전 조건과 Compact한 공간제약의 경우 PCHE(Printed Circuit Heat Exchanger) Type 공급 가능합니다.

A heat exchanger that heats the fuel gas of a gas turbine, a major piece of equipment for combined cycle power plants, to the required temperature.

A gas turbine generates power using energy rotating turbine wings with heat energy of high temperatures and pressure fuel gas. The fuel gas heater is a heat exchanger increasing the temperature of fuel gas to enhance the heat energy of fuel gas. It is applied as a TEMA BFU type (low-finned u-tube type). For high-pressure operation conditions and compact spatial restriction, the PCHE (printed circuit heat exchanger) type can be supplied.





Fuel Gas Heater After Cooler

복합화력 발전소의 주기기인 가스 터빈의 안정적인 온도를 위한 폐쇄 순환 냉각수를 냉각시키는 열교환기입니다.

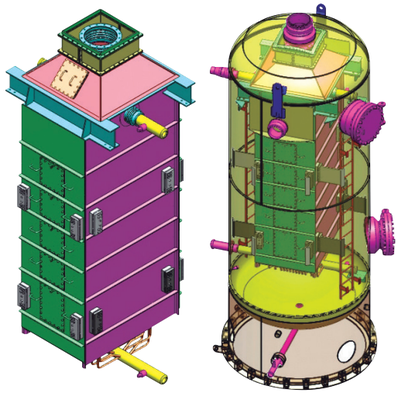
A heat exchanger that cools closed circulation cooling water to maintain a stable temperature of the gas turbine, a major piece of equipment.

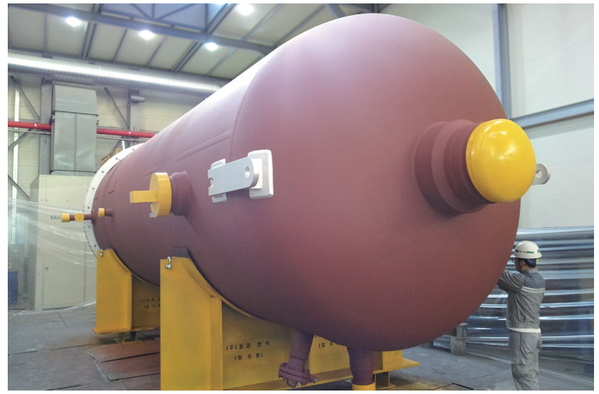


Turbine Cooling Air Cooler

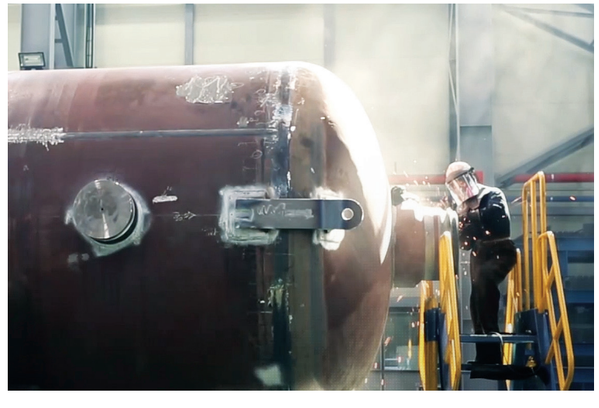
가스 터빈의 안정적인 온도를 유지하기 위해 가스 터빈을 Cooling Air로 냉각시키는데, 가스 터빈을 냉각시키고 온도가 상승한 Cooling Air를 냉각시키기 위한 열교환기입니다.

A gas turbine is cooled with cooling air to maintain a stable temperature of the gas turbine, and this is a heat exchanger to cool the gas turbine and the cooling air whose temperature has risen.









APPLICATION FOR COMPRESSOR

Compressor에서 최종 압축된 가스를 냉각시키기 위해 Compressor의 후단부에 설치되는 열교환기입니다. 산업용 ASU 플랜트나 오일&가스 플랜트 등의 Compressor에서 공기나 가스의 온도를 냉각 및 습분을 제거하여 압축기의 효율 증대 및 소요동력의 절감을 위한 열교환기며, 이러한 공기나 가스는 최종 단의 Cooler에 의해 압축 이후 After Cooler를 통하여 요구되는 온도로 냉각 후 사용되어집니다. 허용압력 손실이 매우 적고 공기의 냉각에 따른 습분의 제거를 위하여 내부에 Demister가 설치되며, 열교환기의 효율 증대를 위해 일반적으로 공기나 가스 Side는 Plate Fin이나, High Fin Type을 적용합니다.

After Cooler







Material Options for Plate Fin Tube type

- **Tubes**
  - Copper Nickel 90/10
  - Copper Nickel 70/30
  - Copper
  - Admiralty
  - Stainless Steel 304
  - Stainless Steel 316
  - Duplex Steel
- **Fins**
  - Copper
  - Aluminum
  - Stainless Steel
  - Copper + Sn coat
  - Aluminum + Sn coat
  - Aluminum + Penolic coat
  - Aluminum + Blygold coat
  - Aluminum + AV coat

Kind of Fluids

- **Shell Side**
  Wet Air / Dry Air / Nitrogen / Oxygen / NH3
  CO2 / CO / CH4 and etc
- **Tube Side Gas**
  Water / Glycol and Water

This is installed at the rear end of the compressor to finally cool the compressed gas of the compressor, and this is a heat exchanger that increases the compressor's efficiency and cuts the amount of power required by cooling the temperature of the air or gas and removing moisture. This is a heat exchanger installed at the rear end of the compressor to cool the finally compressed gas from the compressor. This is actually a heat exchanger to increase the compressor's efficiency and cut the amount of power required in an ASU plant or an oil and gas plant by cooling the temperature of the air or gas, and removing moisture. The air or gas is used after being cooled at the required temperature through the after cooler, after the air or gas is compressed by the final cooler. A small amount of pressure can be lost, and a demister is installed inside to remove moisture when cooling. For the air or gas side to increase the efficiency of the heat exchanger, the plate fin or high fin type is applied.

Inter Cooler







Application Fin/Tube Size

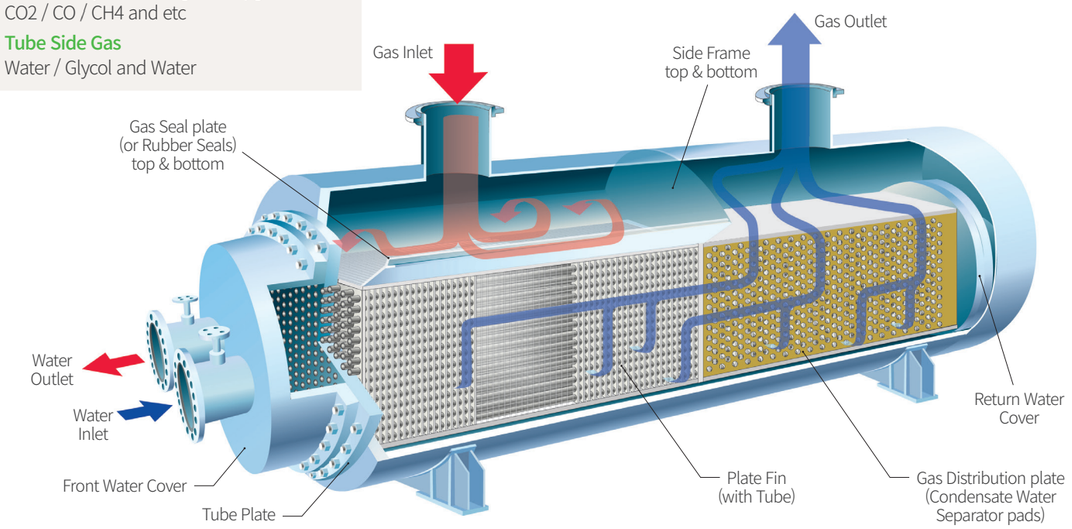
- **Tubes**
  OD 12mm / OD 14mm / OD 16mm /
  OD 19.05mm / OD 25.4mm
- **Fins Th'k**
  0.15mm / 0.2mm / 0.25mm / 0.3mm

Capabilities / Range of Application

- **Shell Diameter**
  Min.400mm(16") to Max. 4000mm(160")
- **Tube Length**
  Min.500mm(1.6') to Max.12,000mm(39')

Design Code Capabilities

- ASME Code
- European PED
- China SELO
- API Code
- Korea KGS / KOSHA
- Japan KHK / JPVC / MHLW
- TEMA R,C and B
- Russian GOST
- ALL CLASS
- Others Country Local Code
  (Algeria, Singapore, ...)



APPLICATION FOR COMPRESSOR

Lube Oil Cooler

플랜트의 Generator 및 Compressor 등 전반적인 회전기기의 윤활공정에서 사용된 윤활유를 냉각수를 이용하여 냉각시키는 열교환기입니다.

3-way 밸브를 사용하여 Working Cooler와 Stand-by Cooler를 즉시 교체 가능합니다. 일반적으로 Shell & Tube Type으로 제작되며, Plate Type 열교환기로도 제작됩니다.

A heat exchanger that cools the lubricant oil used in the lubricating process of the rotating equipment including the generators and compressors in a plant that uses cooling water.

The working cooler and the stand-by cooler should be immediately replaced using the 3-way valve. The equipment is generally manufactured as a shell and tube type and is also manufactured as a plate type heat exchanger.









APPLICATION FOR POWER GENERATION

Closed Cooling Water Cooler (CCW)

터빈 축의 윤활유 공급 장치, 터빈축의 기밀 장치, 발전기의 수소 냉각 장치, 발전기 상부 고정자의 냉각 장치 등의 냉각수를 냉각시키는 열교환기입니다.

A heat exchanger that cools the cooling water of a turbine axis-lubricant oil supply device, a turbine axis' airtight device, a generator's hydrogen cooling device, and the cooling device of generator's top part fixing equipment.







Deaerator

탈기기는 용존 가스, 특히 급수의 산소와 이산화탄소를 제거하기 위한 기계 장치입니다. 스프레이 & 트레이 타입은 육상용탈기기에 사용되며, 스프레이 & 스크러버 타입은 선박용 탈기기에 사용됩니다. (주)동화엔텍은 스프레이 밸브, 트레이, 스크러버와 같은 주요 부품을 개발하여 더 높은 효율의 탈기기를 연구하고 있으며, 열설계, 강도 계산, 자재 조달 및 제작능력을 보유하고 있습니다.

A machine to remove dissolved gas, especially oxygen and CO_2. The spray and tray type is used for deaerators on land, and the spray and scrubber type is used as a ship deaerator. Donghwa Entec develops major parts such as the spray valve, tray, and scrubber, and researches higher efficiency deaerators. We have heat design, intensity calculation, material procurement, and manufacturing capabilities.



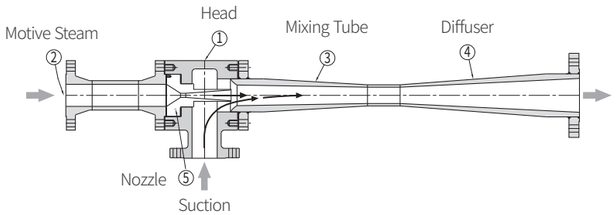




Ejector Vacuum System

Vacuum Steam Condenser 내 진공상태를 유지하도록 일정하게 공기를 추출하기 위한 스팀으로 운전되는 Ejector와 사용된 스팀을 응축시켜 재사용하기 위한 Condenser를 결합한 열교환기입니다.

A heat exchanger that combines an ejector operated with steam to constantly extract air to maintain the vacuum state within the vacuum stem condenser and a condenser that condenses the used steam and reuses it. If air gets into the condenser and if the condenser's vacuum decreases, the turbine performance declines. To remove air within the condenser, a steam-operated ejector is needed, and a condenser is needed to condense the operated steam. This heat exchanger consists of the one-layer ejector, interim condenser, 2-layer ejector, and final condenser. Maintenance/repair is easy as no rotating equipment is included.







Feed water Heater (HP/LP)

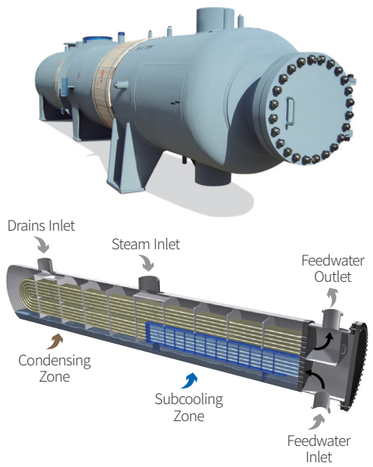
보일러의 급수를 가열하는 열교환기입니다. 급수의 재가열은 동력사이클의 효율을 높이는데 필수적이며 스팀터빈에 의해 제어되거나 제어되지 않는 스팀을 사용하여 급수를 최대 허용 범위까지 가열합니다. 급수가열기는 최대 3구역으로 구성이 되며 고효율 De-superheating-zone, Condensing-zone 그리고 Sub-cooling-zone입니다.

Heat exchanger heating water supply of the boiler. Reheating the water supplied is essential to enhance the power cycle, and the equipment heats the water supply to the maximum allowable amount using the steam controlled or uncontrolled by the steam turbine. The water supply heater consists of 3 zones maximum: de-superheating-zone, condensing-zone, and sub-cooling-zone

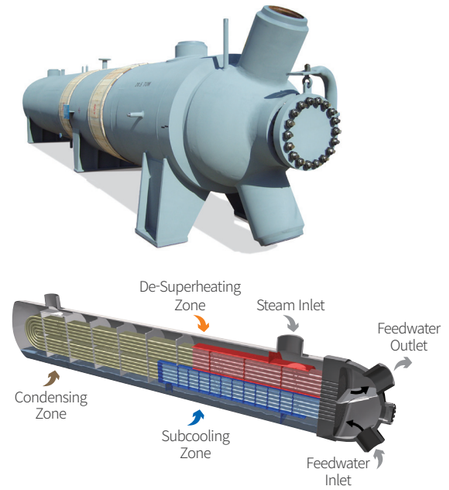




LP Feed Water Heater



HP Feed Water Heater



QUALITY CERTIFICATIONS

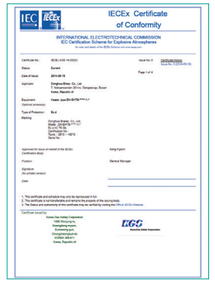

BV


CSEL(ML) A1


LR


MAN


ASME-RPT

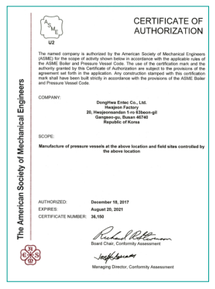

IECEx

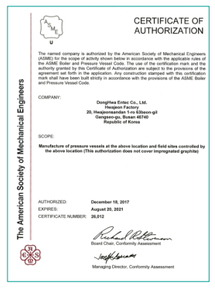

ISO 9001

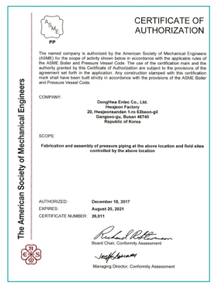

KR


NK


RS


ASME-U


U2


PP


KEPIC


DNV.GL

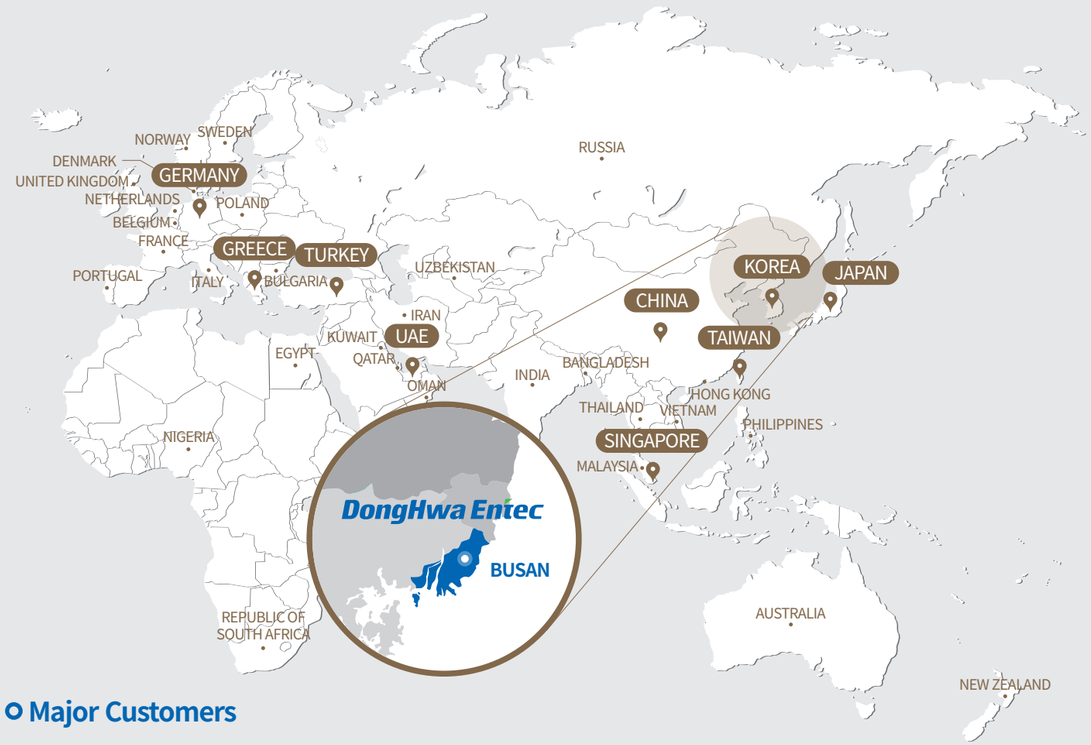
Accreditation details	Scope	No.	Certification body
ISO 9001	Design and manufacture of pressure vessels, heat exchangers and energy saving systems for ships	A 0858	KR
ASME U	Manufacture of pressure vessels (Sect. VIII, Div.1)	26,012	ASME
ASME U	Manufacture of pressure vessels (Sect. VIII, Div.2)	36,150	
ASME PP	Fabrication and assembly of pressure piping	26,011	
ASME PRT	Fabrication of part with design (Sect. VIII, Div.1)	55,652	
KEPIC MN	Construction of class 2,3 vessel and storage tank	MN-543	KEPIC
SELO A1	Manufacture of pressure vessel (A1)	TS2200485-2020	SELO
DNVGL	Manufacture of welded pressure vessel Class I & II	AMT000003B	DNVGL
LR	Fusion welded pressure vessels Class 1	MD00/2674/0003/FW	LR
BV	BV Mode II Scheme for Class I & II pressure vessels	SMS.W.II./1223/E.0	BV
KR	Manufacture of Welded Class I & II pressure vessels	GCH00681-BP001	KR
CCS	Type approval for L.O. Cooler	FS18T00006_01	CCS
	Type approval for AUX. Boiler FO Heater	FS18T00006_02	
	Type approval for Air Charge Cooler	FS18T00032	
RS	Type Approval Certificate for Condenser	17.10465.296	RS
	Type Approval Certificate for Vaporizer	17.10466.296	
	Type Approval Certificate for Heater	17.10467.296	
	Type Approval Certificate for TCH, BOG, Glycol	17.10468.296	
IECEx	IECEx Certificate (Heater)	IECEx_KGS_14.0002X	KGS
	IECEx Certificate (Glycol Water Heater)	IECEx_KGS_15.0004X	
MAN	Approval for Scavenge Air Cooler	2700-2013-386.0	MAN
	Approval for Charge Air Cooler	2700-2014-402.0	
	Approval for EGR Cooler	2700-2018-673.0	

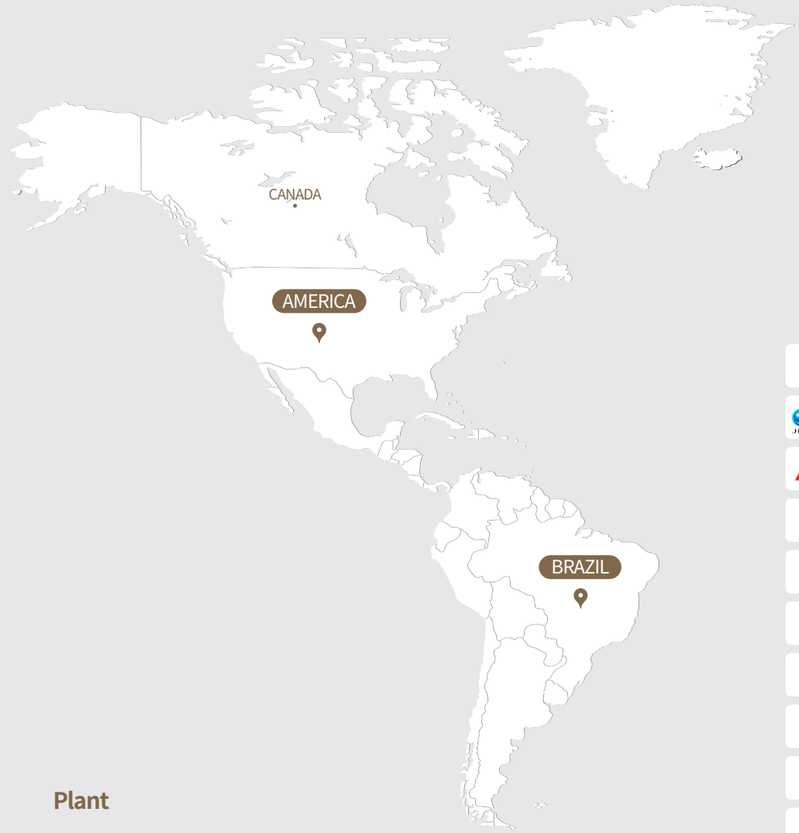

ISO 45001


ISO 14001


OHSAS 18001

SALES A/S NETWORK & MAIN CUSTOMER





Major Customers

Marine

- Hyundai Heavy Industry
- Hyundai Samho Heavy Industry
- Doosan Engine
- Doosan Infracore
- MAN DIESEL & TURBO
- DSME Co., Ltd.
- DSEC
- Hyundai Mipo Dockyard
- HANJIN HEAVY INDUSTRIES & CONSTRUCTION
- Atlas Copco Comptec LLC
- EXCELERATE ENERGY L.P.
- Hanwha Techwin CO., LTD.
- POSCO E&C
- Samsung Heavy Industry
- STX offshore & shipbuilding Co., Ltd.
- Hyundai Engine
- STX engine
- CSBC CORPORATION
- IMABARI SHIPBUILDING CO., LTD.
- KAWASAKI HEAVY INDUSTRY, LTD.
- MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
- IMEX CO., LTD.
- IZUMI STEEL WORKS, LTD.
- MITSUBISHI HEAVY INDUSTRIES, LTD.
- NAMURA SHIPBUILDING CO., LTD.
- SASEBO HEAVY INDUSTRIES CO., LTD.
- HITACHI ZOSEN CORPORATION.
- DAIHATSU DIESEL MFG.CO., LTD.
- JAPAN MARINE UNITED CORPORATION
- SUMITOMO HEAVY INDUSTRIES, LTD.
- IHI CORPORATION
- NIIGATA POWER SYSTEMS CO., LTD.
- OSHIMA SHIPBUILDING CO., LTD.
- YANMAR CO., LTD.
- DAEHAN SHIPBILDING CO., LTD.
- DAESUN SHIPBUILDING & ENGINEEING CO., LTD.
- SUNDONG SHIPBUILDING & MARINE ENGINEERING CO., LTD.
- SPP SHIPBUILDING CO., LTD.
- LIQUID GAS EQUIPMENT PROCESS
- KEPPEL SHIPYARD
- Wärtsilä Oil & Gas Systems AS
- Sembcorp Marine
- Exmar Shipmanagement NV
- Gaslog LNG Services Ltd.
- STX HEAVY INDUTRIES CO., LTD.

Plant

- FUJI ELECTRIC
- GS E&C
- HYUNDAI ENGINEERING
- POSCO E&C
- SAMSUNG ENGINEERING
- LOTTE ENGINEERING
- SK E&C
- SUMITOMO HEAVY INDUSTRIES
- MHPS-TAKASAGO
- MHPS-HITACHI
- MHI-EC
- CB&I
- TOYO ENGINEERING
- KAWASAKI HEAVY INDUSTRY
- DOOSAN HEAVY INDUSTRIES
- MITSUI ENGINEERING & SHIPBUILDING
- SHIN NIPPON MACHINARY
- EBARA PUMP
- ELLIOTT EBARA
- MITSUBISH HEAVY INDUSTRIES COMPRESSOR
- IHI CORPORATION
- HANWHA TECHWIN
- GENERAL ELECTRIC
- MITSUBISH ELECTRIC
- KOBE STEEL
- ATLAS COPCO
- INGERSOLL RAND
- SHINKO AIR
- MAN DIESEL & TURBO
- AIR LIQUIDE
- MISUZU INDUSTRY

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