



NEW TECHNOLOGIES & RELIABLE PRODUCTS WE SERVE

CRYOGENIC VAPOR RECOVERY UNIT

VAPOR COMBUSTION UNIT

SOLVENT VAPOR RECOVERY UNIT

IONIC TYPE COMPRESSORS FOR HYDROGEN REFUELING STATION



co-prosperity and harmony



principles and fundamentals



emphasis on safety and quality



Change and Innovation Leadership



TRUST ENGINEERING & CONSTRUCTION

www.tecco.kr

For over 20 years, T.E.C CO.,LTD has been a medium-sized company focusing on the engineering, design, manufacturing and construction of industrial equipment including pressure vessels, heat-exchangers and metal storage tanks. Additionally T.E.C was the first in Korea to develop the cryogenic vapor recovery units(C-VRU) for removal or recovery of specific VOCs/hydrocarbons, and has expanded its business to provide total solution services for customized atmospheric environmental devices with patented technologies(C-VRU, VCU, SRU) to various industrial clients.

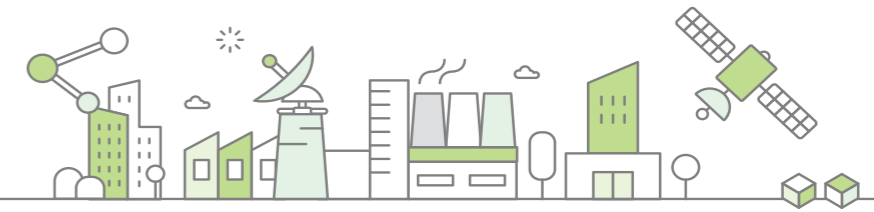
SINCE 1998

Licenses we have

- Environmental construction work (atmospheric)
- Steel structure construction work
- Gas Facility Construction work(1st Grade)
- Manufacturing of special equipment(reactors & pressure vessels, HEXs)
- Machinery facility Construction work
- Scaffold · structure dismantling construction work

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SERVICES WE DO



Tank Terminal & Steel Structure Construction Work

- Construction to build or install structures by using metals such as storage tanks, iron frames, handrail, stairway etc.
- Tank terminal construction works such as civil, field tanks and piping with insulation



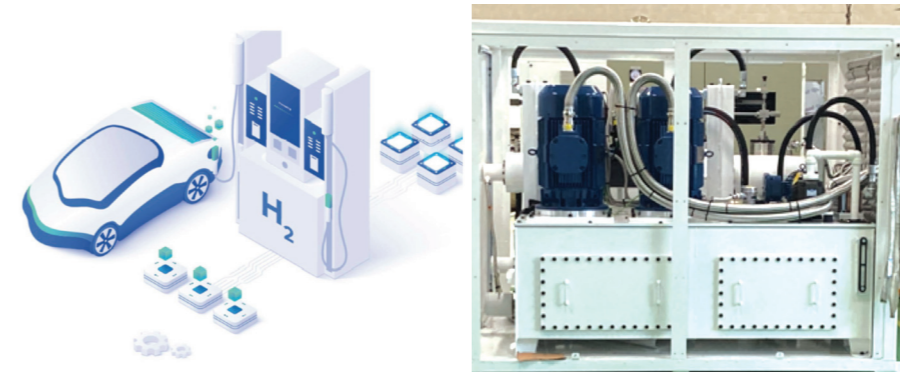
Manufacturing of Special Facility

- Chemical equipment such as thermal/vacuum reactors, columns, pressure vessels(drums, condensers, heat-exchangers)
- High pressure gas-tanks, cylinders, refrigerators and specified equipment



Environmental Construction Work (Atmospheric)

- Cryogenic vapor recovery unit(C-VRU) utilizing liquid nitrogen or refrigerant of binary refrigeration system
- Self-combustion incineration equipment(VCU) with relatively low temperature combustion of VOCs(C, H)
- Adsorption and desorption equipment(SRU) with dual activated carbon beds



Hydrogen Refueling Station & Hydrogen Compressor

- Engineering & construction work of the hydrogen refueling stations for the FCEV cars, buses & trucks
- Design, manufacturing and supply the newly developed ionic compressor(TIC-90 Series) package system



Machinery Construction Work

- Machines & piping installation works for chemical plants
- Plumbing, hygiene and air conditioning facilities
- Ventilation, water supply, dust collector installation etc.



Plant & Structure Dismantling Work

- Plant & steel structure dismantling work
- Metal/sandwich panel demolition and re-installation for building

TECHNOLOGY & PRODUCTS

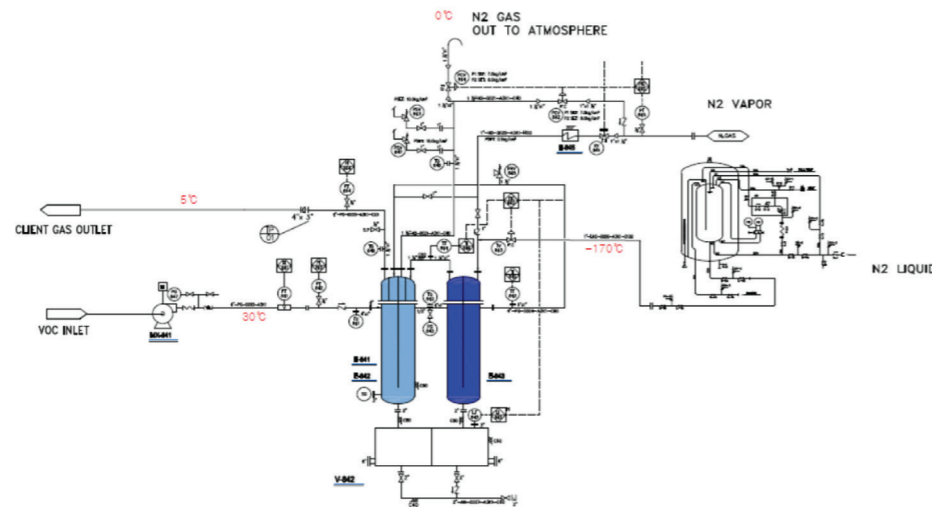
Cryogenic Vapor Recovery Unit (C-VRU)

Basic concept

Cryogenic vapor recovery units(C-VRU) represent a total approach to reduce or minimize the emissions of VOCs into the atmosphere. The conversion of VOCs to liquid through condensation is typically over 99.0 %.

If the condensed and recovered VOCs are not contaminated in any way by the process itself, they can be recycled and cryogenic liquid nitrogen used to the system will be vented off as a gas directly into the atmosphere without detrimental effect to the environment, or can be reused elsewhere on-site process when needed.

In case, liquid nitrogen is not possible to use or not possible to reuse as a gas on-site, refrigerants of the appropriate binary refrigeration system can be used as a cryogenic source.



Applications

- An effective option for recovering/removing VOCs that are present in high concentrations and low flow rates.
- Applies to VOCs of chemical companies that use organic solvents, or cause secondary environmental pollutants during incineration, and petrochemical plants and tank terminal companies collecting VOCs generated during product loading into storage tanks and tank-lorry shipment, and drum packaging.
- Suitable for tank terminals with a high volume of gasoline tanks or crude-oil refinery plants.
- One of the pre-treatment solutions to alleviate the amount of pollutants that enter existing environmental facilities, helping to relieve the burden on these facilities and promote sustainable emissions management.

Features

- Patented technology has been newly developed and successfully commercialized for the first time in Korea.
- Design and manufacture for the recovery/reuse of VOCs condensates and gaseous nitrogen.
- Skid package structure offers space-saving benefits, thanks to its compact and simple design, making it easy to install.
- Easy to build explosion-proof equipment as there are no ignition sources.
(Applicable VOCs : AN, MC, Chloroform, PCE, TCE, gasoline etc)
- More effective for a single substance that is expensive, has a low flowrate and high concentration.
- Applied to the condensation of hydrocarbons(EO, PO etc.)
- Methylene Chloride less than 1.0ppm and Acrylonitrile less than 0.2ppm (results of 5 measurements)

Latest projects



Client	Vopak Terminal Korea Ltd. Ulsan 2T
Capa	C-VRU (50Nm/hr)
Usage	Vapor from MC storage tanks
Period	2020. 08~2021. 11



Client	SNF Korea Ltd. Ulsan
Capa	C-VRU (60Nm/hr)
Usage	Vapor from AN storage tanks
Period	2021. 12~2022. 05



Client	Taekwang Ind. Ltd. Ulsan
Capa	C-VRU (400Nm/hr)
Usage	Vapor from AN+VAM storage
Period	2021. 08~2022. 03



Client	Taekwang Ind. Ltd. Petrochemical 3
Capa	C-VRU (300Nm/hr)
Usage	Vapor from AN storage tanks
Period	2021. 08 ~2022. 02

TECHNOLOGY & PRODUCTS

Vapor Combustion Unit (VCU)

Basic concept

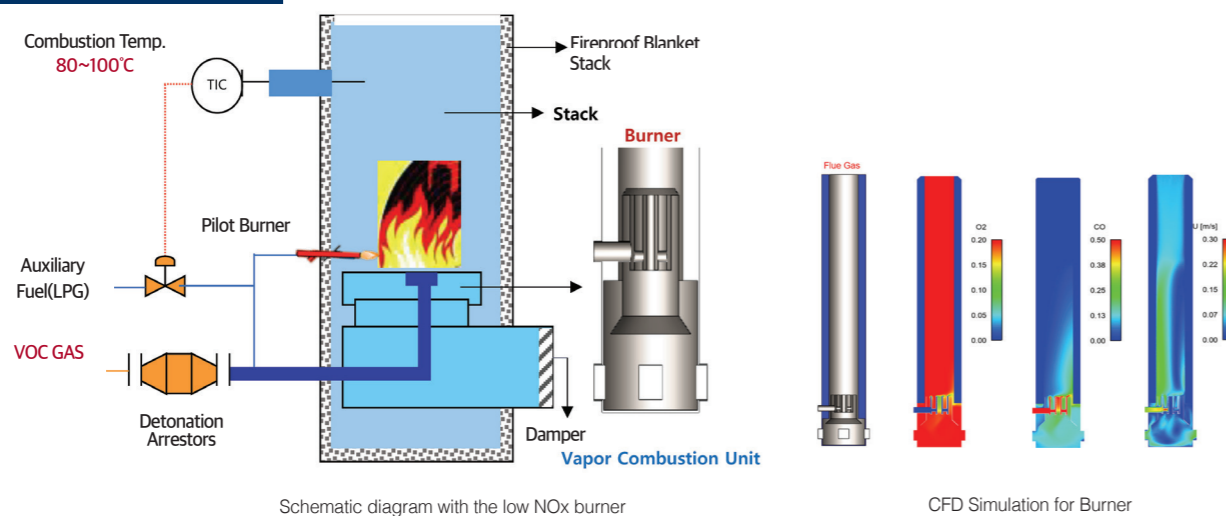
Proven devices used to reduce or eliminate emissions through the thermal destruction of waste gases emitted to the atmosphere in the operations of filling tanks at tank terminals for liquid cargo and petrochemical applications. The system has low NOx anti-flashback burners and detonation arrestors for safety.



Features and advantages

- The ideal solution for tank terminals or chemical processes that experience significant fluctuations in VOCs concentration and flow rate. Its flexibility and adaptability make it a reliable and effective option for managing a wide range of conditions.
 - 98~99% thermal destruction removal efficiency of VOCs and hydrocarbons of gasoline
 - Low NOx operation and compliance of environmental standard
 - Anti-flashback burners and detonation arrestors for safety
- Burner control for relatively low combustion temperature
- Easier operation/maintenance procedures
- Compared to RTO systems, our solution offers a low investment cost while still achieving effective VOCs management

Schematic of VCU process

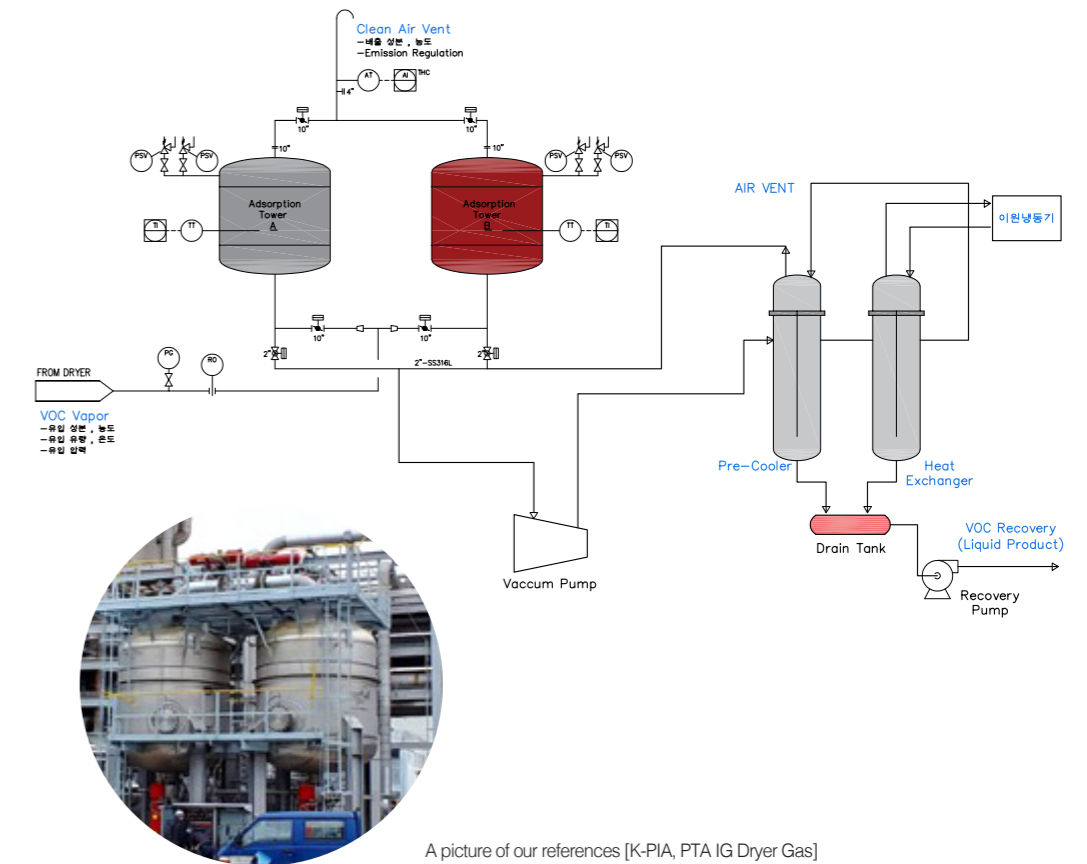


Solvent Recovery Unit (SRU)

Basic concept

Solvent recovery unit(SRU) is a device to keep the adsorption efficiency constant having active beds(towers) filled with activated carbon with micro-pores to eliminate organic gases and odors. VOCs are physically adsorbed by passing through the active bed, and the destroyed activated carbon is repeatedly regenerated by steam or vacuum desorption.

Schematic of SRU process



Advantages

- Dual activated carbon beds that enable efficient VOC adsorption during operation, as well as effective regeneration of the activated carbon. This innovative design ensures optimal performance and longevity of the system.
- Designed for easy operation and maintenance, with a proven track record of reliability. This ensure minimal downtime and maximum productivity for your operations.
- VOCs adsorbed to active carbon can be removed through a vacuum pump or steam(3kg/cm²G)
- Removal or recovery of condensates through the condenser or Cryogenic vapor recovery
- Our solution is versatile and can be applied to a wide variety of VOCs like gasoline, naphtha, BTX, hydrocarbon, making it a flexible and effective option for managing emissions across different industries and applications.

HYDROGEN IONIC COMPRESSOR for Hydrogen Refueling Stations

Description

- The newly developed ionic compressor is the first of its kind in Korea. It can offer high performance, durability, efficiency, and excellent leakage prevention compared to the conventional compression systems.
- A two stage parallel liquid piston column is driven by the individual hydraulic pump.
- Hydrogen gas is sucked and compressed in the liquid column by up-down motion of optimal ionic liquid which is nearly non-compressible and non-volatile.
- The Compact skid structure is composed of a hydraulic unit, intensifier(Hydraulic booster) and liquid piston columns.



Clients

- Providers/suppliers of hydrogen refueling stations for the FCEV vehicles.
- Companies that are involved in producing and distributing by-product hydrogen gas use compression techniques to increase its pressure up to 45MPa.
- Large scale hydrogen shipping terminals for compressed hydrogen end-users.
- Logistics centers utilizing construction machinery like fork lifters, backhoes, etc.



Technology Requirements

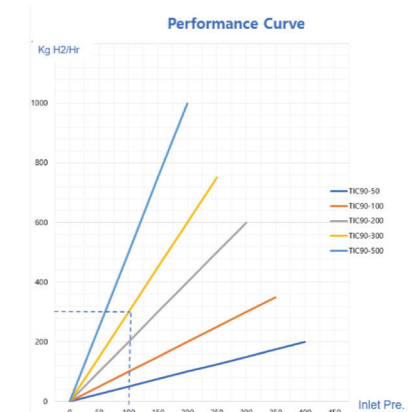
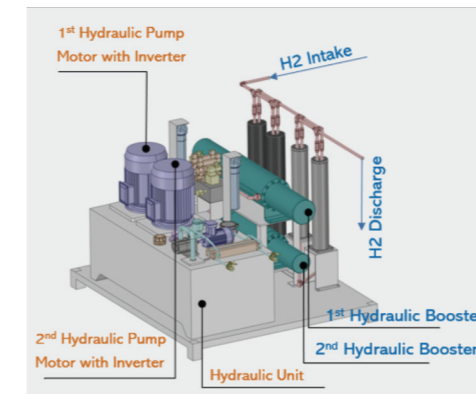
- Low operating/maintenance costs, noise level and require less installation area compare to the conventional metal piston or diaphragm compressor system.
- Need to increase the usage ratio of domestically produced devices, equipment and parts to avoid import dependence.
- Necessity of securing full-cycle technology for all the devices used in hydrogen refueling stations

Distinction

- Operable in a wide hydrogen gas suction pressure range(1~20MPa).
- The ionic compressor is engineered and designed to achieve specific compression capacity.
 - Design knowhow for the hydraulic Unit and liquid piston columns.
 - Design of compression package system considering installation space and economic feasibility of the hydrogen refueling stations.
- Know-how on the PLC based automation control systems.

Advantages

- Unique technology for the ionic compressor from design to operation.
- Price competitiveness compared to the conventional compression solution.
- Normally max. 100MPa of discharge pressure with capacity of 50~100kg/hr @110bar.
- Self-developed inter cooling & after cooling system is applied.
- Secured some know-how and expertise through the verification test and long-term self-commissioning.



Technical Specification

Model	TIC 90-50	TIC 90-100	TIC 90-300
Capacity(kgH ₂ /hr) @11MPa, 15°C Suction Pressure	50	100	300
Suction Pressure(MPa)	1~20	1~20	1~20
Max. Discharge Pressure(MPa)	100	100	100
Compression Stage	2 Parallel	2 Parallel	2 Parallel
Electric Power(Kw) × Q'ty	37×2	57×2	75×2
Heat Exchanger	R407	R407	R407
Specific Energy Consumption	Under 2.0kwh/kgH ₂	Under 2.5kwh/kgH ₂	Under 2.5kwh/kgH ₂
Noise Level	75dB @5meter	75dB @5meter	75dB @5meter
Controller	VFD & PLC	VFD & PLC	VFD & PLC
Packaging	Skid Cabinet	Skid Cabinet	Skid Cabinet

patents

압력 체적 변환부와 토크 변환부를 구비한 액체 가압형 가스압축장치(특허등록 : 제10-1668672)
 이온성 액체를 이용한 가스압축장치(특허등록 : 제10-2417189호)
 Hydrogen gas compressor (Application for design registration : 30-1216843)