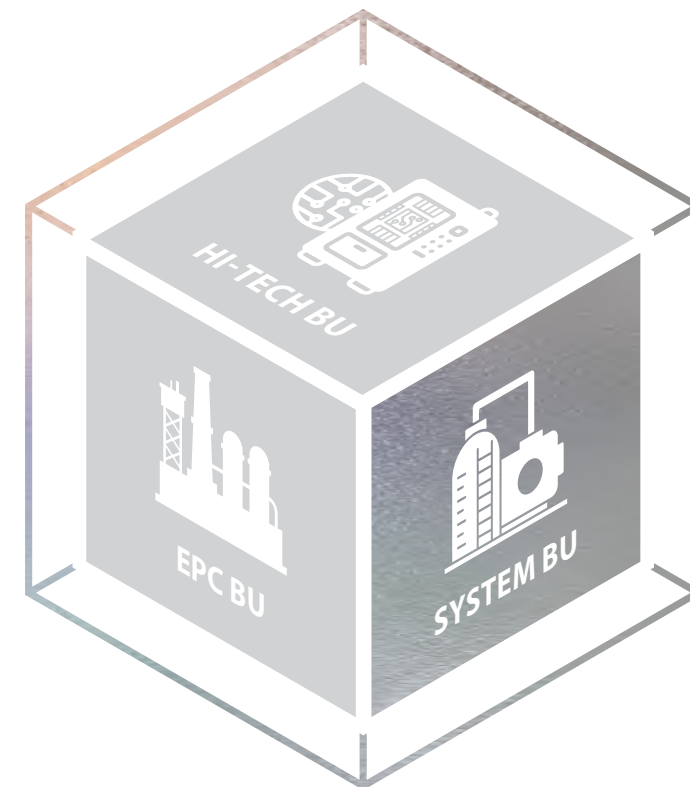


TOTAL SOLUTION PROVIDER

SYSTEM BU



HANYANG ENG CO.,LTD

72, Yeongtong-ro 26beon-gil, Hwaseong-si, Gyeonggi-do, 18380, Korea
Tel. 82-31-695-0000 Fax. 82-31-204-0394

<http://www.hanyangeng.co.kr>

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A Global Company that Provides
Total Engineering Solutions

HANYANG ENG is leading the creation of customer value
by implementing the best quality and services through quality management.
HANYANG ENG, which provides the best total service to customers with the best
technologies in the semiconductor and display fields, industrial plants
(general industry and gas industry), environment, green energy, and aerospace field,
is realizing sustainable growth with creative technologies to create
a bigger tomorrow through innovation.

Business Area

- ACQC(Auto Clean Quick Coupler)
- Drum System
- Transfer System
- Supply System
- Mixing System
- Slurry System
- Liquid Waste Collection System
- Automation System
- Customizing System
- CCSS(Central Chemical Supply System)

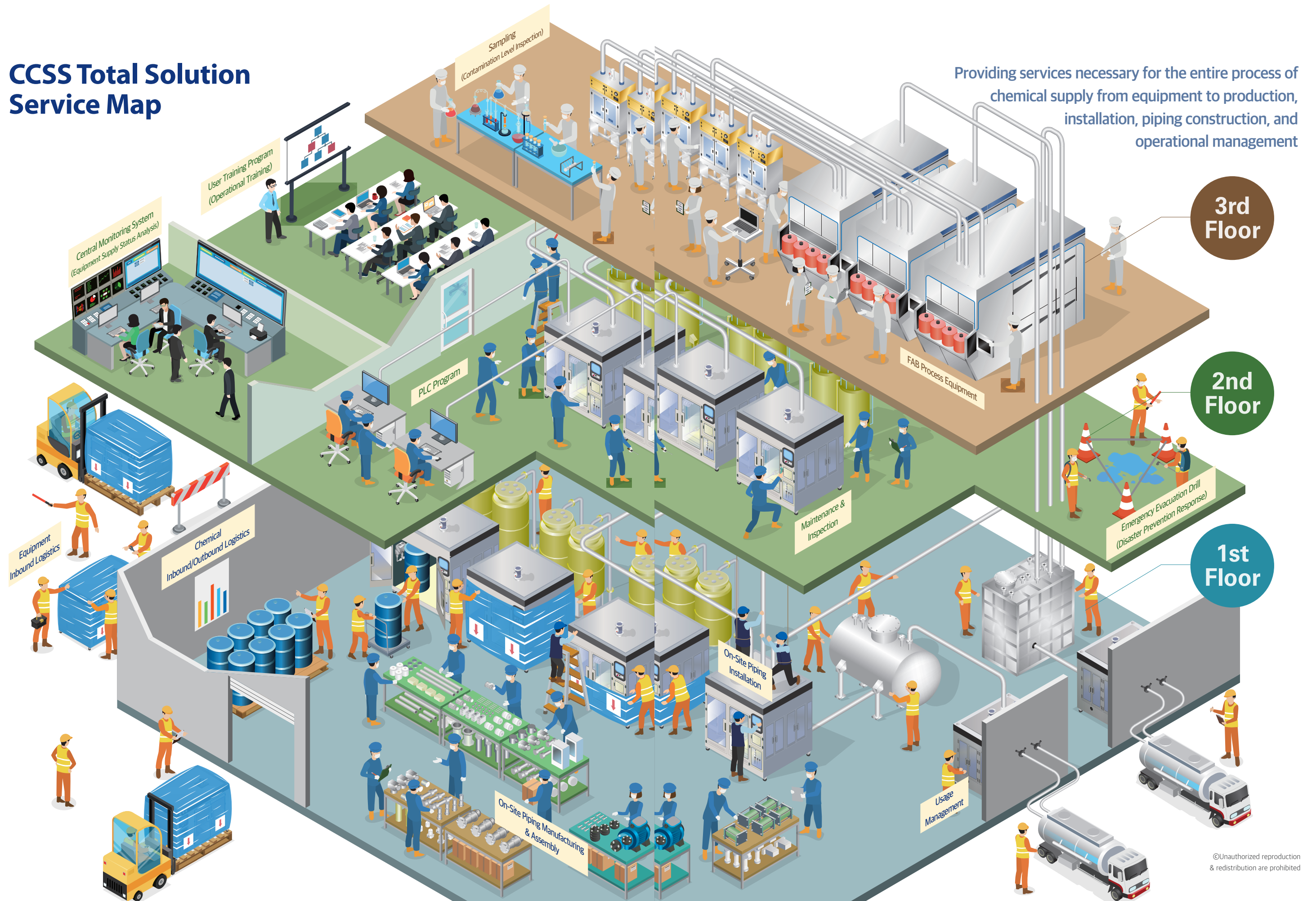
SYSTEM BU

**We Strive for Customer Satisfaction
with the Best Technology and Quality**

HANYANG ENG's Total Chemical Management System is the proud achievement of the System Business Unit.

The System Business Unit plays the role of a Total Solution Provider that provides the service of the entire process of chemical substance supply from design to manufacturing, installation, operation, and maintenance with our own technology to satisfy customer needs.

CCSS Total Solution Service Map



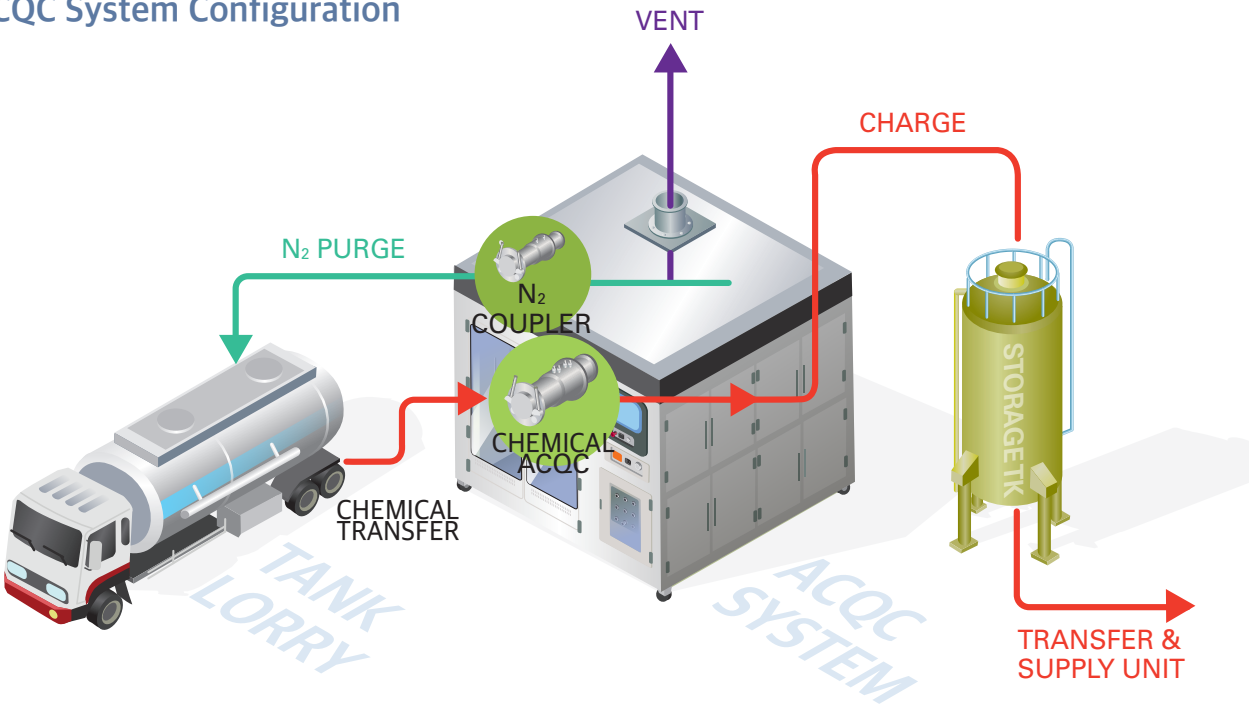
ACQC System

Clean & Safe Automated Transfer System

The ACQC (Auto Clean Quick Coupler) System prevents external contamination with automatic cleaning and drying functions added to the coupler connection process for transferring the chemicals contained in the tank truck to the large-capacity storage tank, and ensures safe chemical transfer by helping the pressurization and exhaustion of the tank truck during the chemical transfer process.

User safety is ensured by installing 2 or more chemical modules in 1 equipment to save space and cost, and automating the entire coupler fastening process, depending on the user environment.

ACQC System Configuration



Unit Information



Material			PVC
Size(W×D×H)			1800×2000×2000(mm)
Weight			800kg
Electrical Specifications			208V-1Φ-60Hz-2.2kW
Flow Rate			100 LPM
Remark			-
Piping			50A
Utility Consumption	CDA	Flowrate	490 LPM
		Pressure	7.5kgf/cm²
	N ₂	Flowrate	450 LPM
		Pressure	6.5kgf/cm²
	Exhaust		15.2m³/min

*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

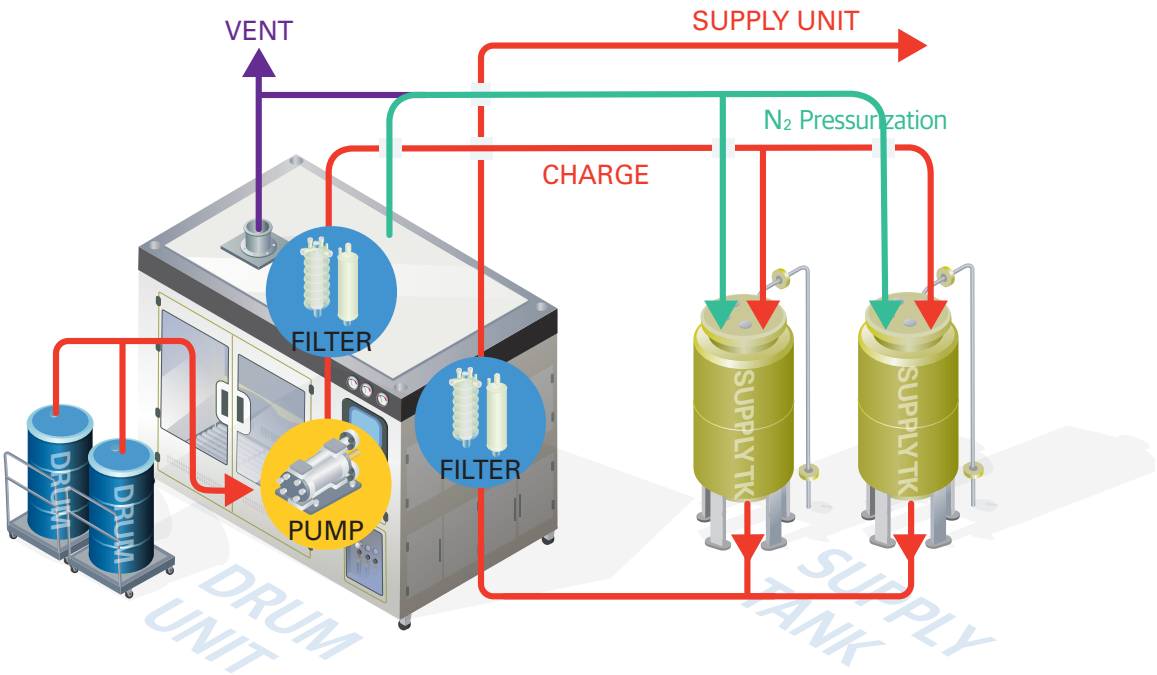
Drum System

The Convenient & Reliable Chemical Storage System

The Drum System, the basic equipment of the central supply system, uses a pump for the chemicals from the drum or canister and the high-purity chemicals, impurities removed by an air separator and high-quality filter, are stored in the tank.

The cross-supply method using 2 tanks and nitrogen gas pressurization guarantees stability and continuity in supply, and can be used for direct supply or transfer depending on the distance from the equipment to be supplied and the required flow rate.

Drum System Configuration



Unit Information

Material			PVC
Size(W×D×H)			2400×1700×2000(mm)
Weight			1800kg
Electrical Specifications			208V-1Φ-60Hz-3.3kW
Flow Rate			30 LPM
Remark			2 Drum
Piping			25A
Utility Consumption	CDA	Flowrate	445 LPM
		Pressure	7.5kgf/cm²
	N₂	Flowrate	295 LPM
		Pressure	6.5kgf/cm²
	Exhaust		17.2m³/min

*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

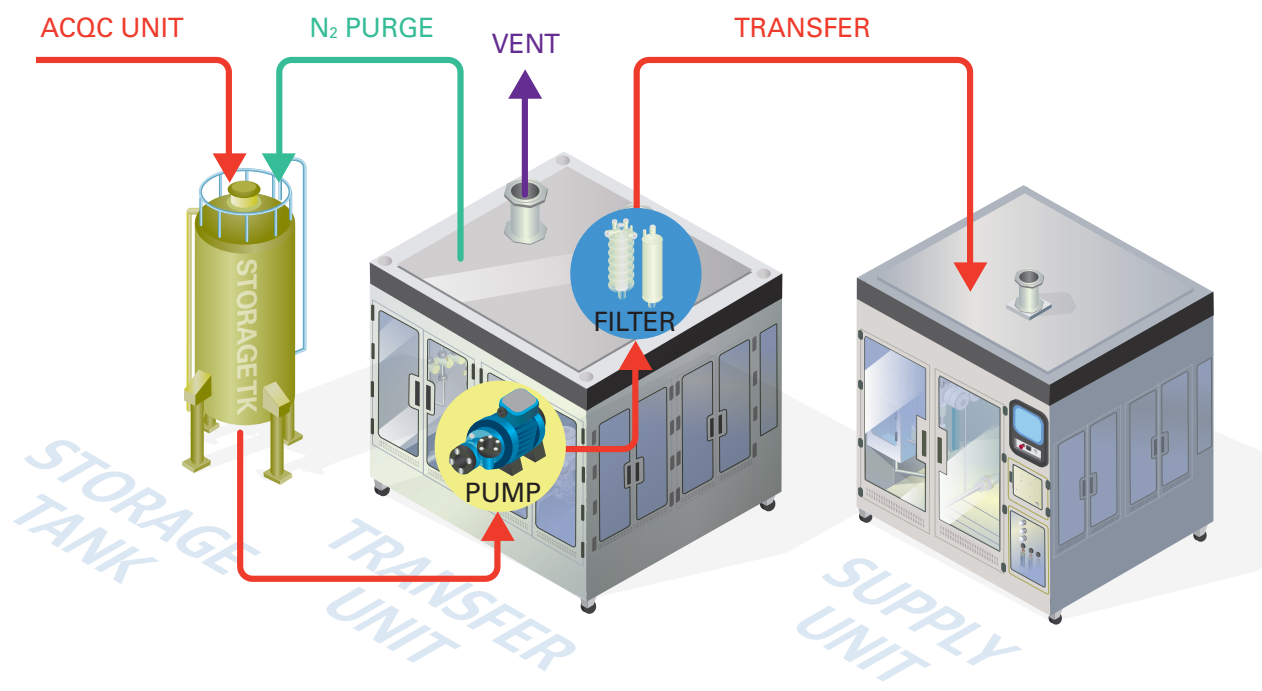


Transfer System

The Optimal Solution for Long-Distance Transfer

The Transfer System is a solution for transferring chemicals from large-capacity storage to equipment to be supplied in a long-distance using a high-performance pump or for distributing flow rate to supply equipment. Stability can be secured by installing it at the optimal location, considering the design conditions such as flow rate, pressure loss, head, etc., when chemicals of a lot of flow rate are required.

Transfer System Configuration



Unit Information



Material		PVC	
Size(WxDxH)		2000×2000×2000(mm)	
Weight		1500kg	
Electrical Specifications		208V-1Φ-60Hz-2.2kW 208V-3Φ-60Hz-7.4kW	
Flow Rate		150 LPM	
Remark		2 Pump	
Piping		40A	
Utility Consumption	CDA	Flowrate	200 LPM
		Pressure	7.5kgf/cm ²
	N ₂	Flowrate	285 LPM
		Pressure	6.5kgf/cm ²
	Exhaust		16.8m ³ /min

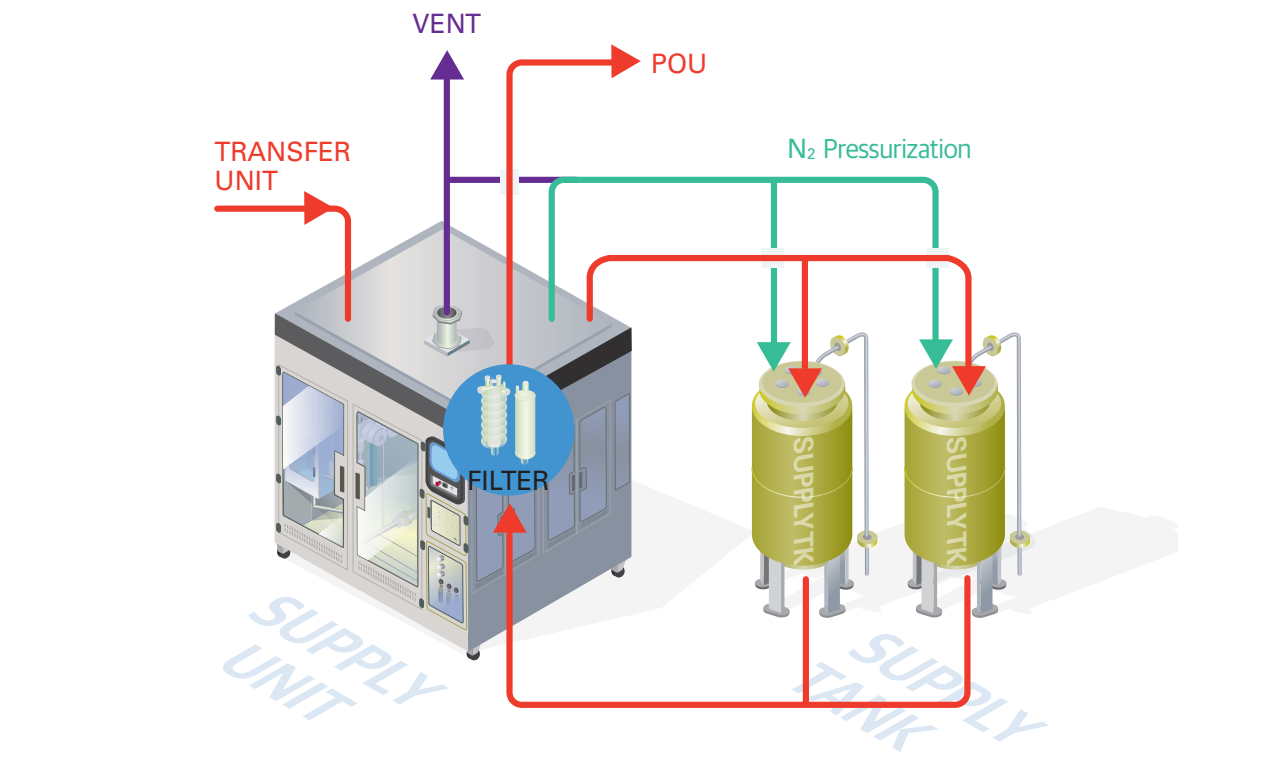
*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

Supply System

The Final Chemical Supply Point

The Supply System, which is responsible for the final supply of chemicals, stores the chemicals from which impurities have been removed in a tank and supplies them through a high-quality filter once more through nitrogen gas pressurization. It is designed to meet the needs of the semiconductor or display process based on the principle of uninterrupted supply and can improve equipment stability by duplexing key parts related to supply.

Supply System Configuration



Unit Information

Material		PVC	
Size(WxDxH)		1900×1800×2000(mm)	
Weight		1200kg	
Electrical Specifications		208V-1Φ-60Hz-2.2kW	
Flow Rate		150 LPM	
Remark		-	
Piping		40A	
Utility Consumption	CDA	Flowrate	200 LPM
		Pressure	7.5kgf/cm ²
	N ₂	Flowrate	285 LPM
		Pressure	6.5kgf/cm ²
	Exhaust		14.4m ³ /min

*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

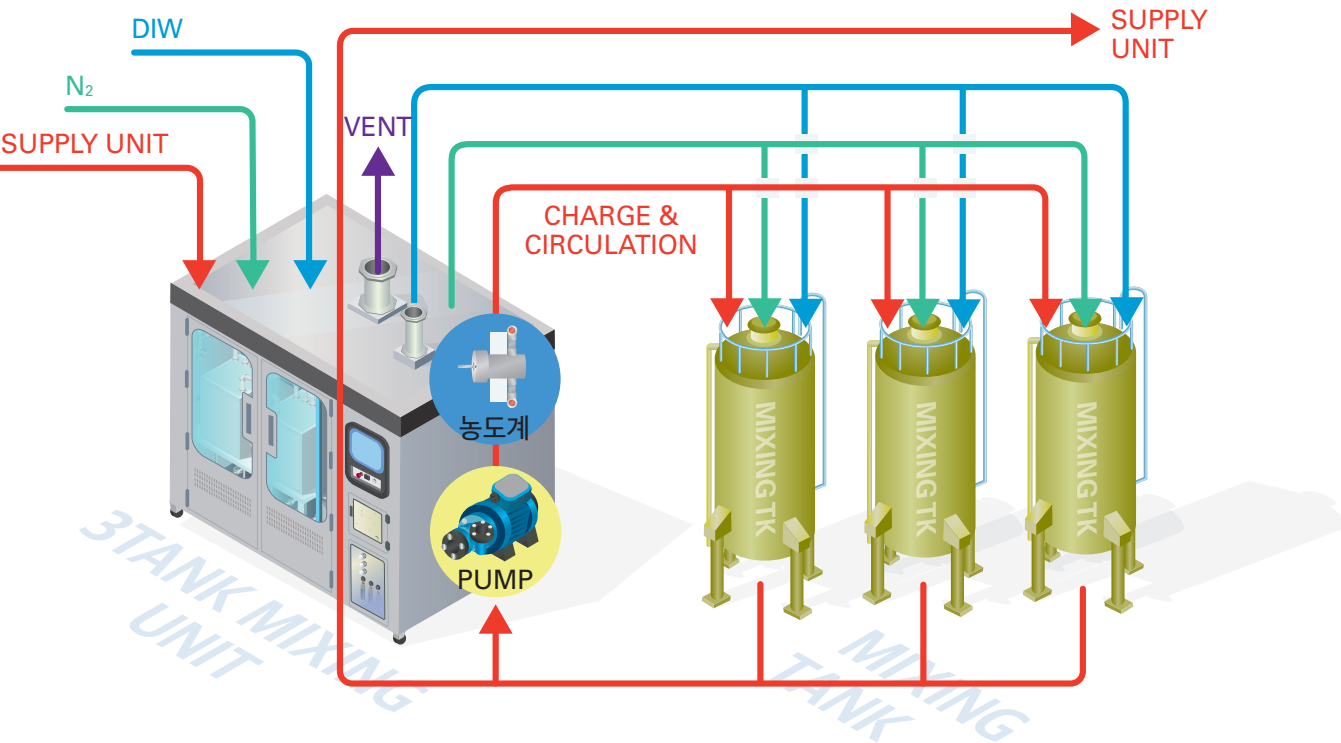


Mixing System

The Precise and Productive Chemical Mixing Solution

The Mixing System dilutes high-concentration chemicals to the optimal concentration required for semiconductor and display manufacturing processes and it dilutes the chemicals of undiluted state using DI. The optimized dilution process and sequential mixing method using tanks guarantee high dilution production and the piping configuration designed with HANYANG ENG's know-how keeps the dilution concentration stable.

Mixing System Configuration



Unit Information



Material			PVC
Size(W×D×H)			3400×1700×2000(mm)
Weight			2300kg
Electrical Specifications			208V-1Φ-60Hz-3.3kW
Flow Rate			56000 L/Day
Remark			1m³ Tank x 3
Piping			25A
Utility Consumption	CDA	Flowrate	200 LPM
		Pressure	7.5kgf/cm²
	N₂	Flowrate	500 LPM
		Pressure	6.5kgf/cm²
	Exhaust		24.3m³/min

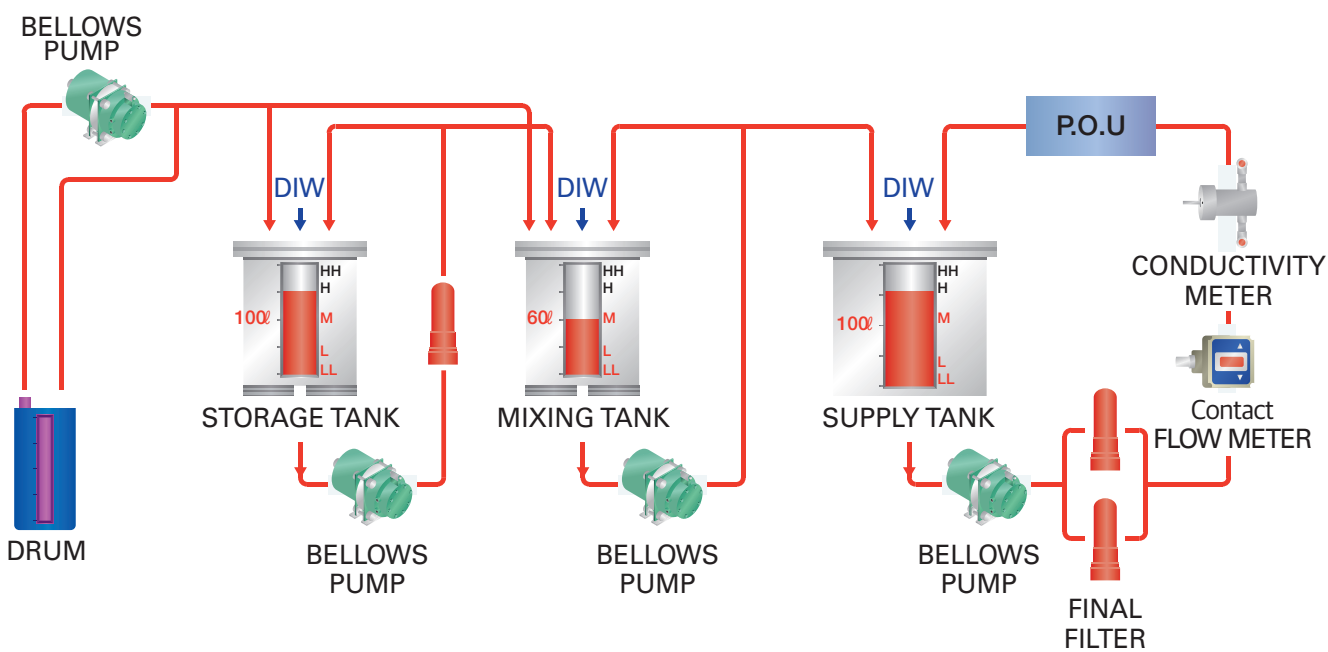
*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

Slurry System

Optimized Solution for Slurry Supply

The slurry is a suspension containing fine solid particles and it is an abrasive that physically and chemically polishes wafers or insulating film layers in the semiconductor manufacturing process to make them flat. It is a medium that transfers the abrasive particles and chemicals of the water, which is the work piece.

Slurry System Configuration (One Drum Option)



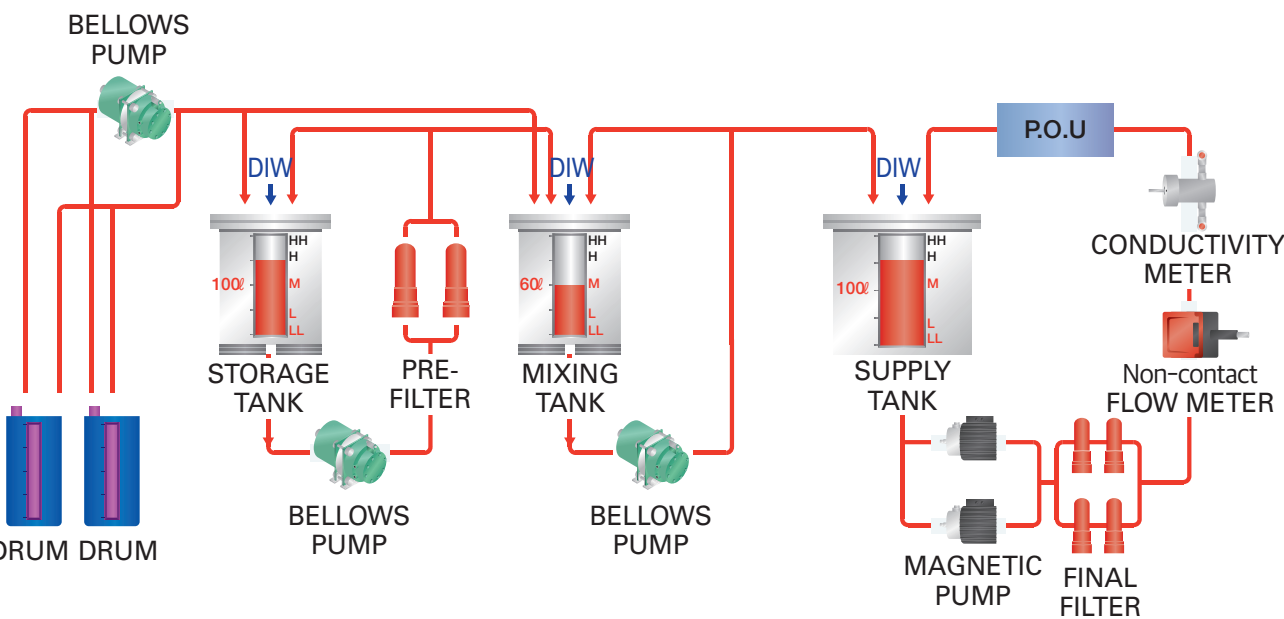
Unit Information

Size(W×D×H)		2600×2000×2200(mm)
Weight		3000kg
Electrical Specifications		208V-1Φ-12kW
Flow Rate		8 LPM
Equipment Type		Single Type
Operation Method		Bellows Pump
Charge Option		1 Drum
Mixing Option		1/2" 1ea
Filter Option	Type	Manual Filter
	Quantity	Pre 1ea, Final 2ea
Parts Option	Flow Meter	Contact Flow Meter
	Measuring Tool	Conductivity Meter
Additional Option		-

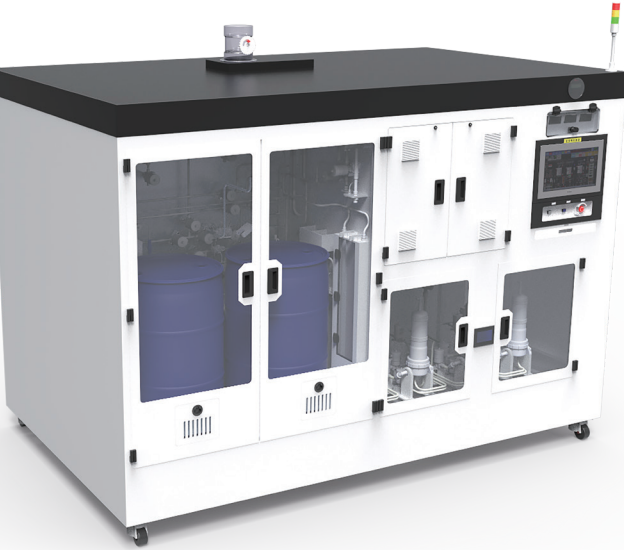


Slurry System

Slurry System Configuration (Two Drum Option)

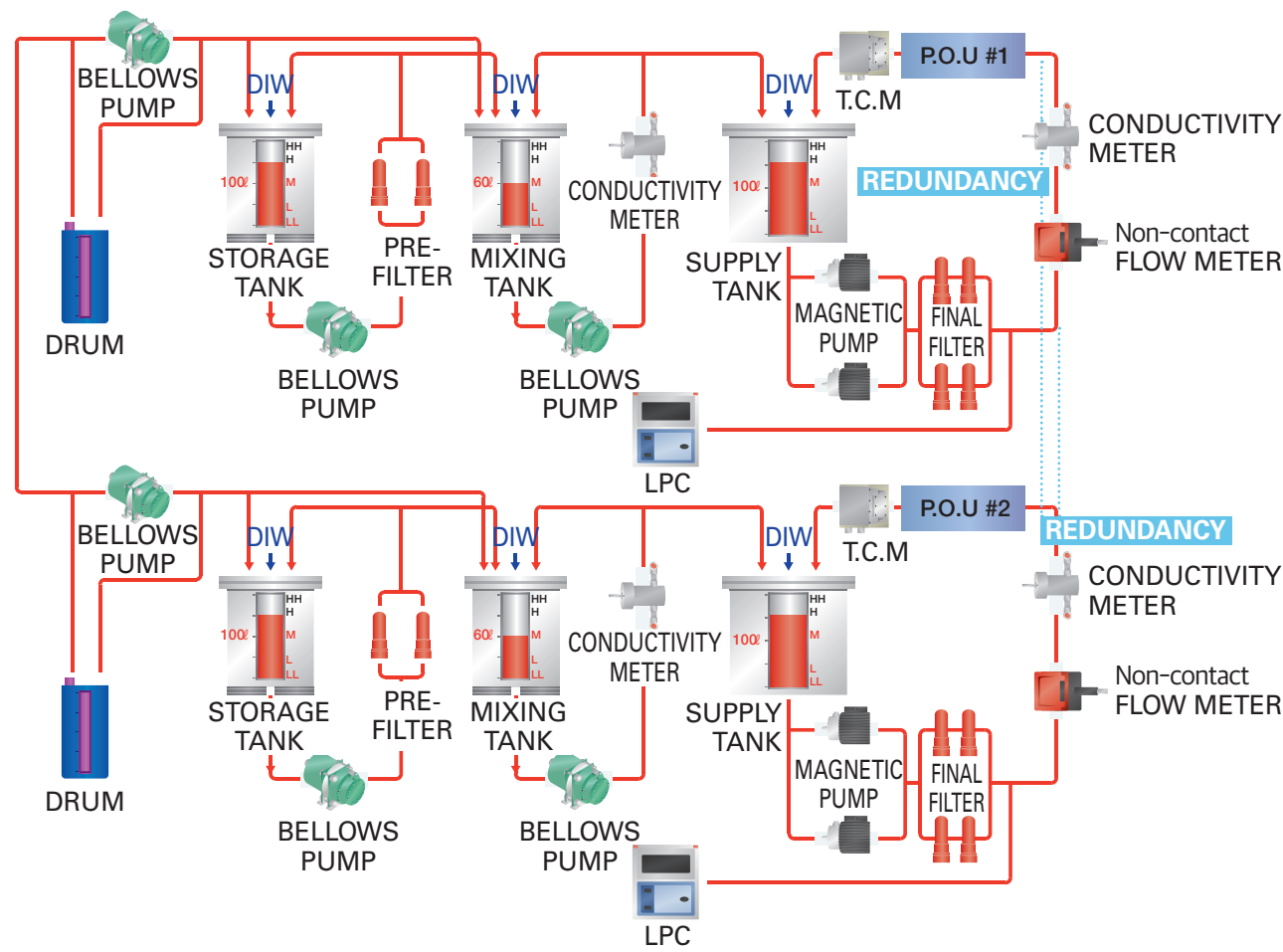


Unit Information



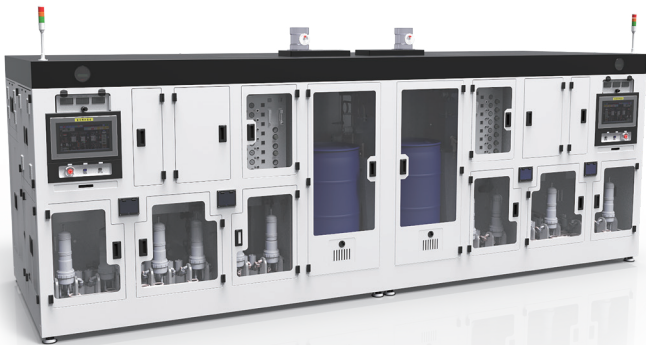
Size(W×D×H)		3300×2000×2200(mm)
Weight		3300kg
Electrical Specifications		208V-1Φ-12kW
Flow Rate		8 LPM
Equipment Type		Single
Operation Method		Bellows, Magnetic Pump
Charge Option		2 Drum
Mixing Option		1/4", 3/4" 2ea
Filter Option	Type	Auto Filter
	Quantity	Pre 2ea, Final 4ea
Parts Option	Flow Meter	Non-contact Flow Meter
	Measuring Tool	Conductivity Meter
Additional Option		Filter Touch Screen

Slurry System Configuration (Two in One, “First” Option)



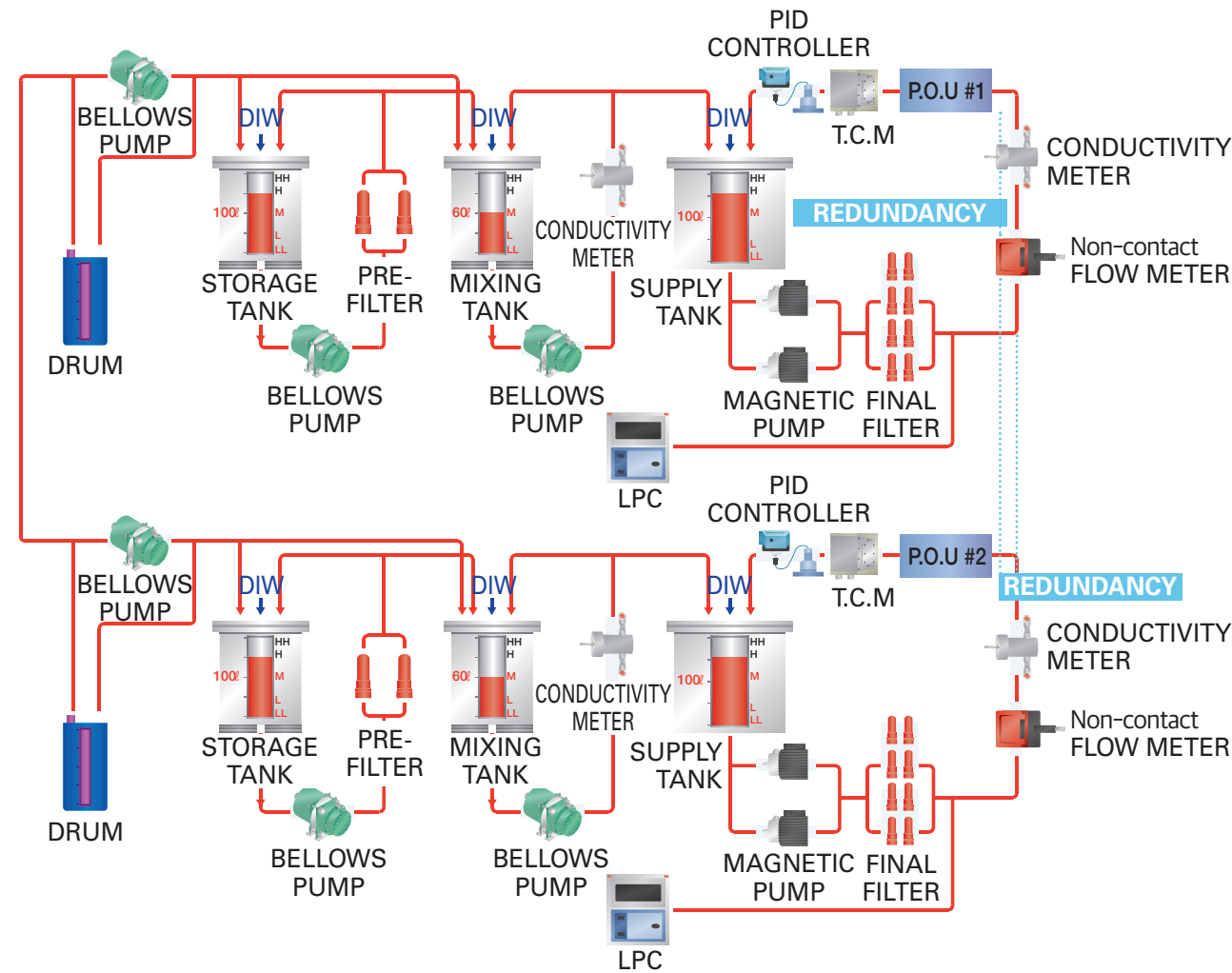
Unit Information

Size(W×D×H)		6000×2000×2200(mm)
Weight		7000kg
Electrical Specifications		208V-1Φ-12kW
Flow Rate		8 LPM
Equipment Type		Single + Single (Redundancy Box로 연결)
Operation Method		Bellows, Magnetic Pump
Charge Option		1 Drum
Mixing Option		1/2", 3/4" 2ea
Filter Option	Type	Auto Filter
	Quantity	Pre 2ea, Final 4ea
Parts Option	Flow Meter	Non-contact Flow Meter
	Measuring Tool	Conductivity Meter
Additional Option		Filter Touch Screen TCM, LPC



Slurry System

Slurry System Configuration (Two in One, “Second” Option)



Unit Information



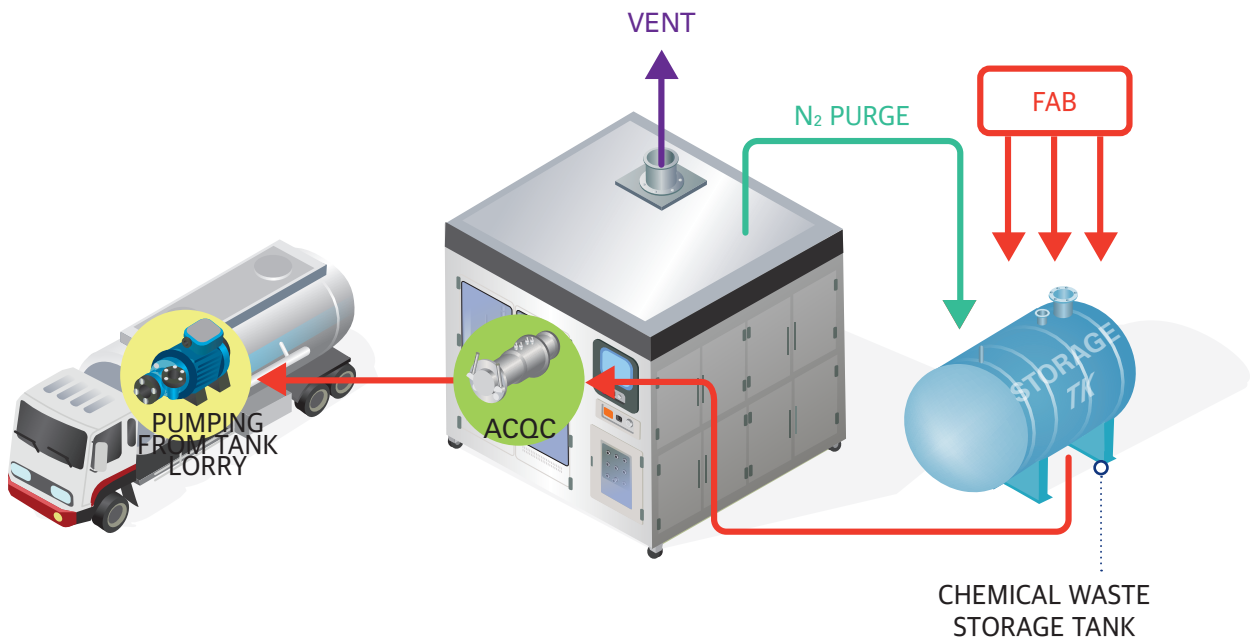
Size(WxDxH)		3300×4900×2200(mm)
Weight		7500kg
Electrical Specifications		208V-1Φ-12kW
Flow Rate		8 LPM
Equipment Type		Single + Single (Redundancy Box로 연결)
Operation Method		Bellows, Magnetic Pump
Charge Option		1 Drum
Mixing Option		1/4", 3/4" 2ea
Filter Option	Type	Auto Filter
	Quantity	Pre 2ea, Final 8ea
Parts Option	Flow Meter	Non-contact Flow Meter
	Measuring Tool	Conductivity Meter
Additional Option		Filter Touch Screen TCM, LPC

Chemical Waste Collection System

The Safe & Reliable Chemical Waste Disposal Solution

This system stores and monitors wasted chemicals in large tanks which were discharged in the process of producing semiconductors and displays. It informs operators of when accumulated wasted chemicals exceed certain amount. In addition, this system can safely build couplers to the tank lorry car to safely dispose of wasted chemicals. It predicts the potential problems which can occur depending on the type of wasted chemicals, and prevents the problems by installing a diluting system or keeping the tank and piping warm.

Chemical Waste Collection System Configuration



Unit Information

Material			PVC
Size(W×D×H)			2400×1800×2000(mm)
Weight			2500kg
Electrical Specifications			208V-1Φ-60Hz-2.2kW 208V-3Φ-60Hz-5.5kW
Flow Rate			-
Remark			-
Piping			40A
Utility Consumption	CDA	Flowrate	445 LPM
		Pressure	7.5kgf/cm²
	N₂	Flowrate	295 LPM
		Pressure	6.5kgf/cm²
	Exhaust		17.2m³/min

*Since the above flow rate is data based on water, it may vary depending on the fluid properties used and site conditions.

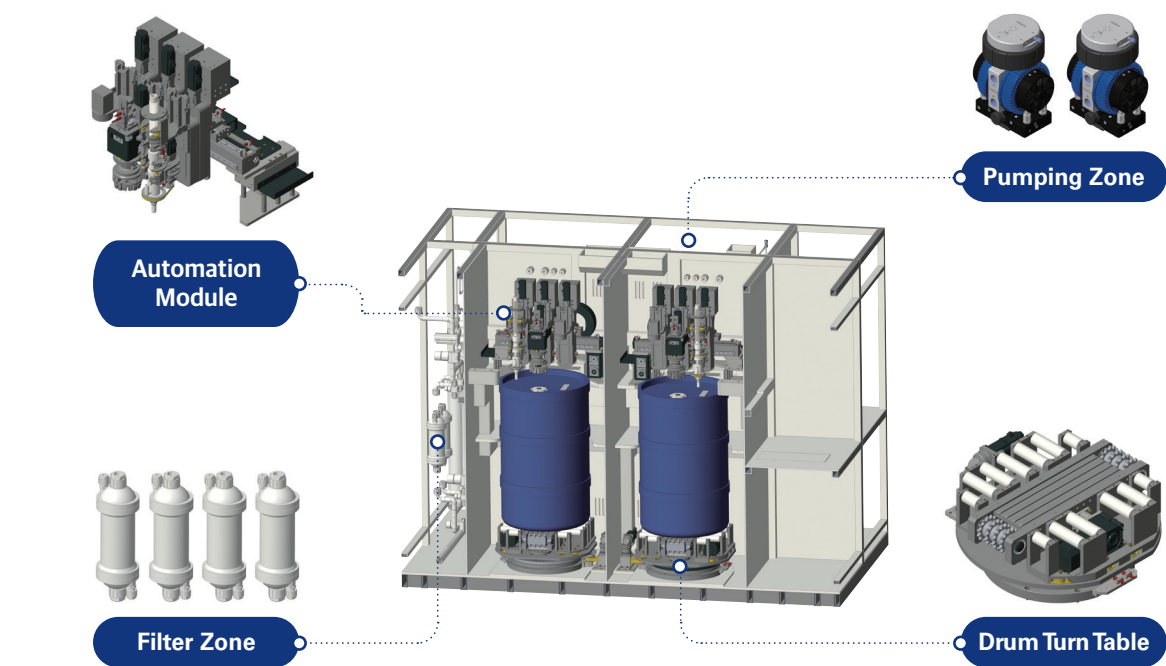


DACS
(Drum Auto Coupler System)

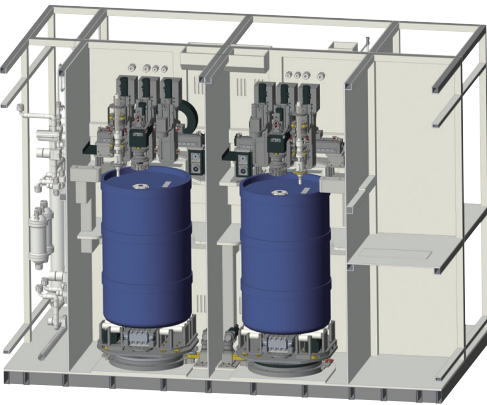
Drum Automation System that Safely Transfers High-purity Chemicals

DACS (Drum Auto Coupler System) is a drum automation supply system that safely transfers high-purity chemicals supplied to the drum to the storage tank and it can prevent safety accidents and exposure of chemicals that may occur during drum replacement by accompanying the loading and fastening processes. The information of the drum brought to the equipment is measured through the vision camera, the precise fastening and supply process are implemented through the servo motor, and maintenance is facilitated by applying the one-touch separation method for each module.

DACS Configuration



Unit Information



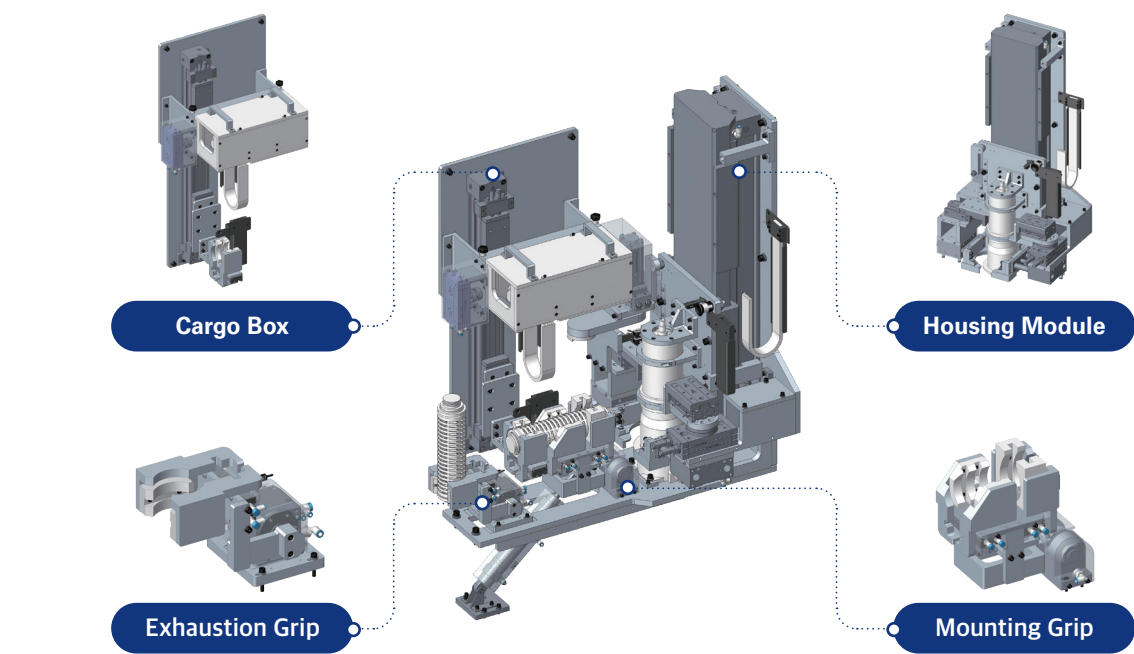
Size(W×D×H)		-
Weight		-
Moving Method		Servo(AC200V, 100W~400V), + Ball Screw
Utility	Power	UPS-AC208V-1Φ-60Hz-12.5kW
	CDA	6 ± 0.5kg/cm²
	N ₂	5 ± 0.5kg/cm²
	PCW	60L/min

SFAC
(Slurry Filter Auto Change)

Automatic Slurry Filter Replacement

SFAC (Slurry Filter Auto Change) is a filter replacement automation system that replaces the filter cartridge required for the slurry supply system by separating and fastening it and it is a system that can prevent safety accidents and exposure of chemicals that may occur during filter replacement. The maintenance is easy as the modular structure simplifies the structure and the cost for filter replacement and the difficulty of manpower supply can be eliminated at the same time.

Slurry Filter Replacement Automation System Configuration



Unit Information

Size(W×D×H)		2200×1000×2200(mm)
Weight		600kg
Moving Method		Cylinder + LM Guide
Utility	Power	AC208V-1Φ-60Hz-40A
	CDA	6 ± 0.5kg/cm²
	N ₂	-
	PCW	60L/min



Customizing System

Implementation of the Optimal System to Meet Customer Needs

HANYANG ENG can implement customized equipment according to customer needs and differentiated systems according to various environments.

Plastic Unit

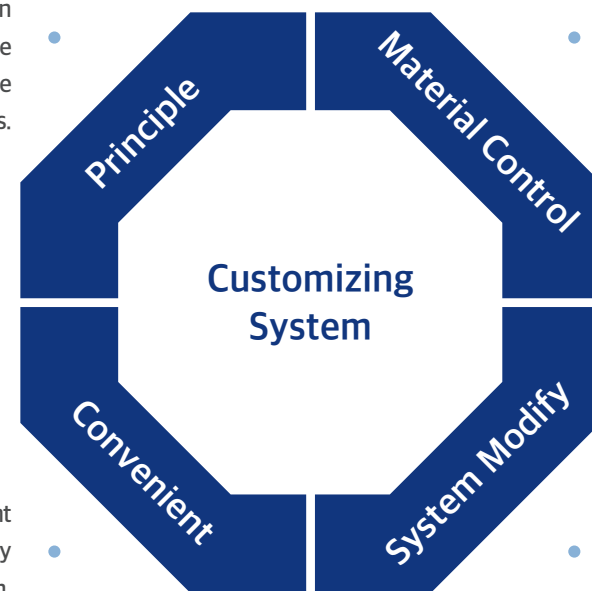


Equipment may vary depending on various conditions but safety is the one principle that does not vary or change under any circumstances.

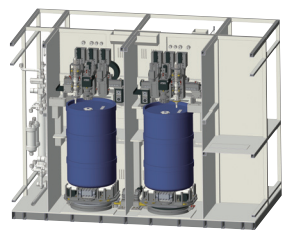
Metallic Unit



The system is composed of materials suitable for each chemical property, such as acid, alkali, solvent, etc.



We pursue convenient equipment operation and maximize efficiency through automation.



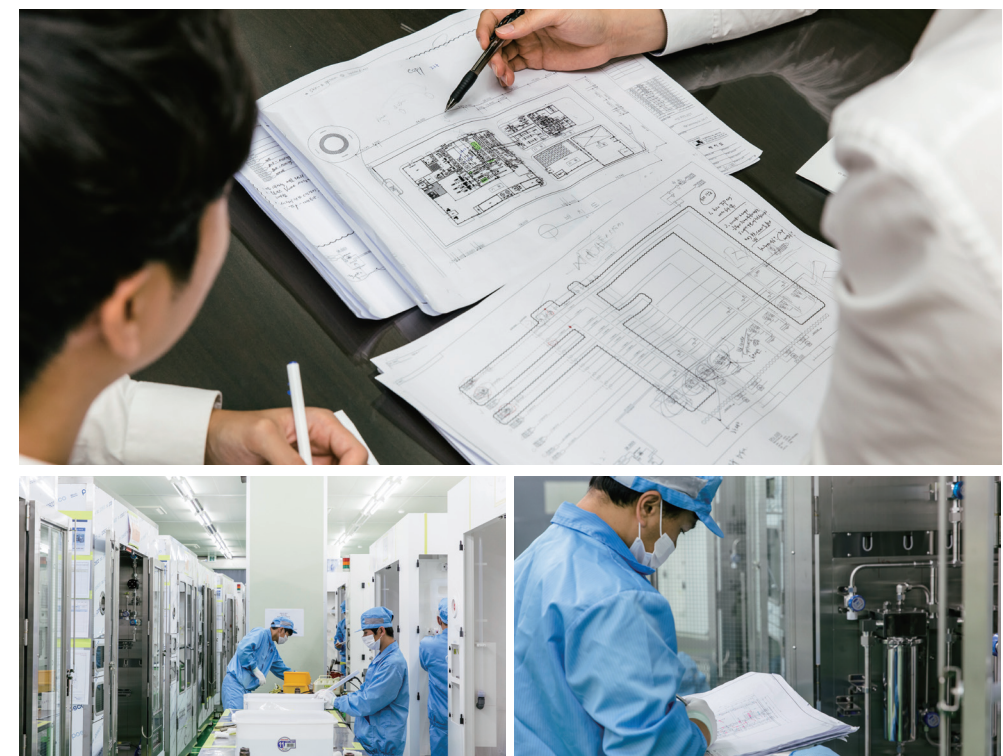
Automation

From simple supply equipment to complex multifunctional equipment, we can freely implement the optimal solution that meets customer needs, environments, and purposes.



Two in One System

Service development 7 Stage



CCSS
(Central Chemical Supply System)

Providing Total Solution Service from Chemical Supply to Maintenance

HANYANG ENG has specialized manpower to manage and operate Central Chemical Supply System that supplies chemicals necessary for semiconductor manufacturing and production processes. In order to sincerely perform the role of a partner of domestic and overseas semiconductor manufacturers, we are always doing our best to provide services that meet the needs of our customers from the point of the set-up of CCSS & slurry equipment to the point of the turn-on by inspecting the work progress with the construction company.

Supply & Quality Management

1

Inbound Logistics of Chemicals & Slurry

Inbound/Outbound Logistics of Chemicals

- Application and inbound logistics of chemicals
- Inspection and storage
- Outbound logistics/inventory management

2

Transfer & Replacement of Chemicals

Original Chemical Replacement

- Undiluted Chemical Solution Replacement
- Supply
- Usage management

3

POU Supply Management

POU Supply Management

- Response to equipment abnormalities
- Replacement of parts
- Spare parts management
- Pressure data management

4

Preventive Inspection of Supply Equipment

PM Preventive Inspection

- Equipment preventive inspection activities
- Analysis of problem cause
- Change-point management

Measures for Abnormalities & Removal of Risk Factors

5

Abnormality Troubleshooting

Trouble Shooting

- Response to abnormalities
- Troubleshooting
- Change-point management
- Risk improvement activities

6

Piping Construction & Replacement of Parts

Equipment Maintenance & Repair

- Parts inspection
- Parts replacement
- Lifetime management
- Piping construction management

7

Removal/Resolution of Illogicality

Training/Safety Activities

- Safety management
- Removal/resolution of illogicality
- Activities to prevent recurrence of problems
- Self-risk assessment

8

Customer Satisfaction & Quality Improvement

Quality Improvement & Customer Satisfaction

- Customer satisfaction
- Improvement of supply quality
- Establishment of a safe workplace

Chemical Drum Charge

Chemicals are safely moved from the stock area to the Central Chemical Supply System is using logistics transfer machines (lifts and hoists) and devices (drum pickers and carts) with FIFO as the basic principle and are processed according to SOP.

CCSS POU Chemical Supply & Maintenance

Through preventive inspection of supply equipment, we manage changes of equipment and detect/predict possible abnormalities in advance to solve problems that can lead to serious accidents at an early stage. We also perform modification work such as equipment and piping construction according to customer requests along with the operational business.

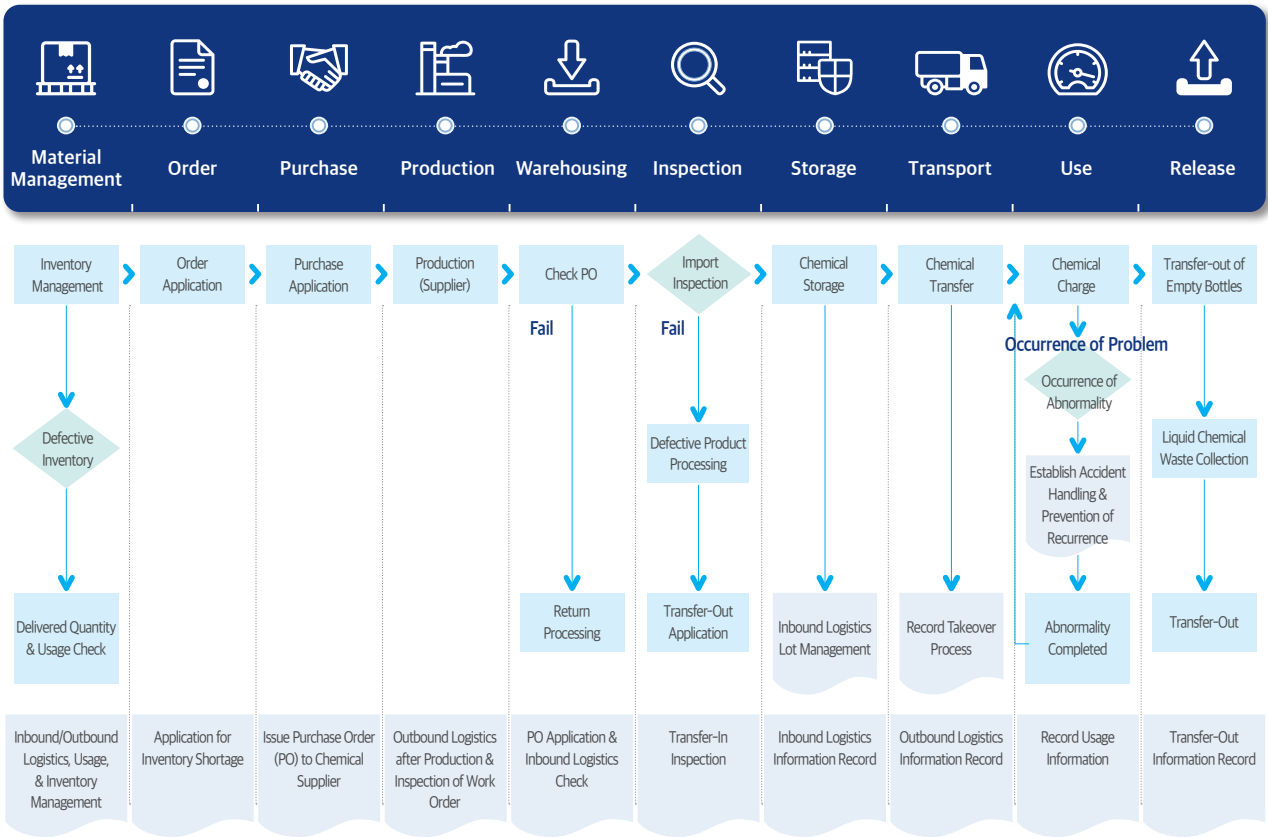
CCSS Training & Emergency Training

We are doing our best to operate uninterrupted equipment 24 hours a day, 365 days a year through safety training for those who handle chemicals and providing beginner/intermediate/advanced training required for understanding and operating CCSS supply equipment.

CCSS Risk Factor Removal & Improvement

Through CCSS 5S and illogicality removal/improvement activities, we are simultaneously discovering and improving potential risk factors, contributing to the prevention of accidents.

Replacement & Transfer-out of Undiluted Solution of Chemicals



HANYANG ENG

HANYANG ENG

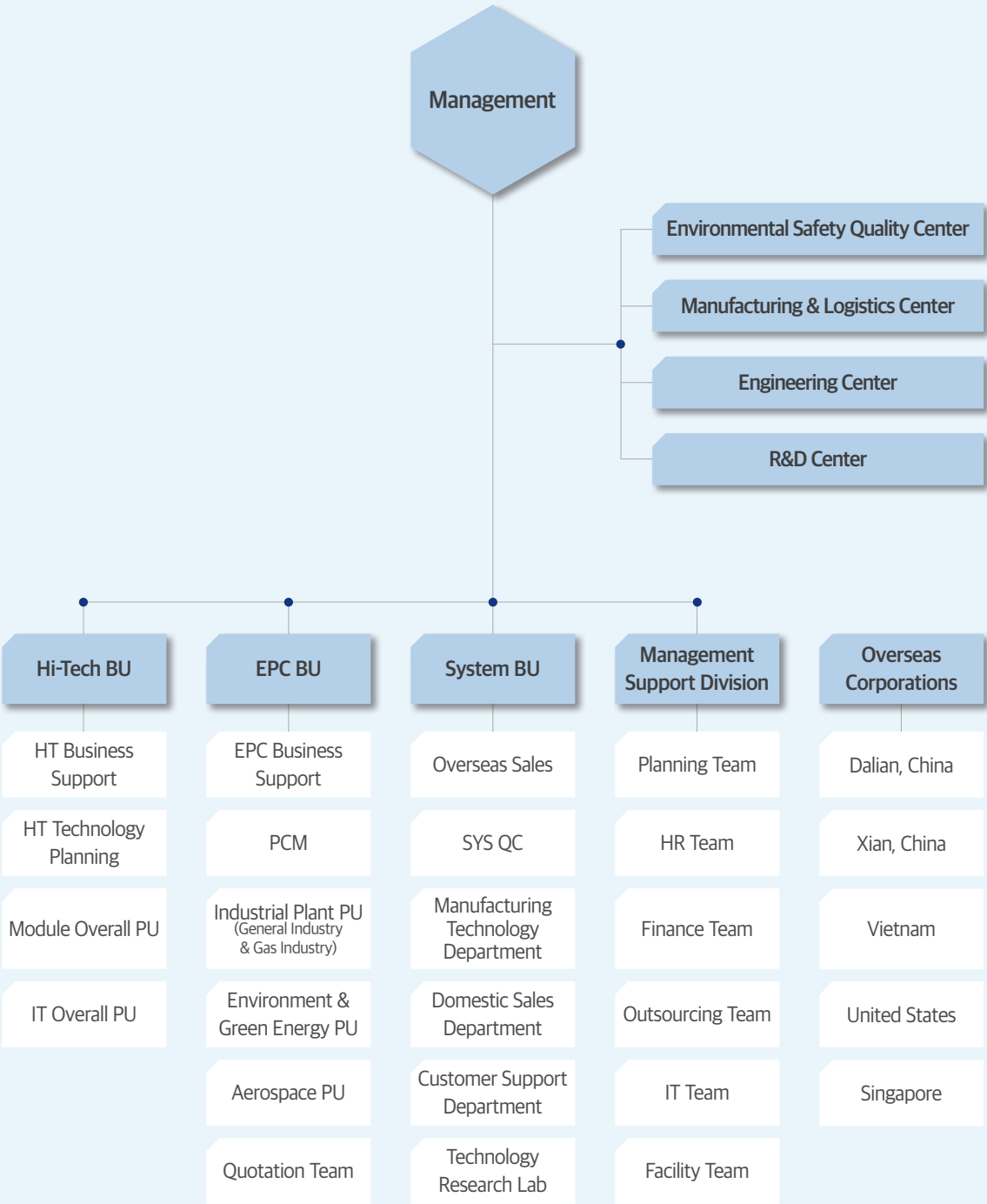
Total Solution Provider

HANYANG ENG has been recognized for its capabilities by accumulating various business experiences and technologies in domestic and overseas markets since its establishment in 1988.

Now, HANYANG ENG is pursuing substantial growth by discovering new business models and new markets in line with the changing global paradigm to enhance future value, and practicing transparent management. Through this, we will be a 'Total Solution Provider' that provides optimized quality and services in not only the semiconductor/display industry but also in the fields of industrial plants, gas, environment, green energy, and aerospace.

 **HANYANG ENG**

Organization

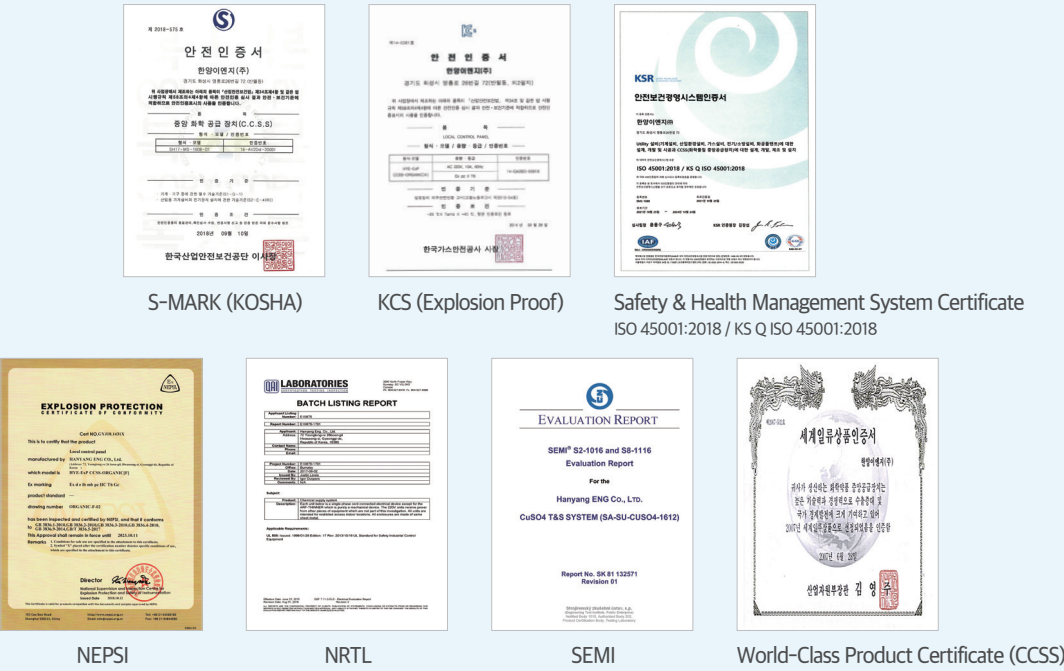


* BU(Business Unit)
* PU(Performance Unit)

Core Value



Certifications



Equipment Safety Certifications

Global Network & Subsidiaries

Domestic & Overseas Business Sites

Domestic

HQ

72, Yeongtong-ro 26beon-gil, Hwaseong-si, Gyeonggi-do
Tel. 82-31-695-0000 Fax. 82-31-204-0394

Seoul Office

Hanyang Bldg., 123, Yeoksam-ro, Gangnam-gu, Seoul
Tel. 82-2-2148-0000 Fax. 82-2-2148-0190

Central Branch (Eumbong)

32, Yeonamsan-ro, Eumbongmyeon, Asan-si, Chungcheongnamdo
Tel. 82-41-541-0139 Fax. 82-41-534-4634

Manufacturing & Logistics Center (Gajae-ri)

482-15, Samcheonbyeongma-ro, Paltanmyeon, Hwaseong-si, Gyeonggi-do
Tel. 82-31-695-9006 Fax. 82-31-354-7943

Manufacturing & Logistics Center (Cheongju)

91, Jikji-daero 307beon-gil, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do
Tel. 82-43-229-0200 Fax. 82-43-229-0279

Overseas

Dalian, China

HANYANG Construction(Dalian) Co., Ltd.
No.127 Liaohe Road, Wanda Plaza, Bulding 4, Room 915, Development Zones, Dalian City, Liaoning, China
Tel. 86-411-8753-6190 Fax. 86-411-8753-6192

Xian, China

HANYANG (Xian) Engineering Co., Ltd.
Room 706, Building A, Yanxiang City Plaza, No. 56 Jinye 1 Road, High-tech Zone, Xi'an, China
Tel. 86-29-8115-4808

Vietnam

HANYANG ENG Vina Co., Ltd.
Unit 2603, Floor 26, Eurowindow B/D, No. 27 Tran Duy Hung Str, Trung Hoa Ward, Cau Giay Dist, Hanoi City
Tel. 84-43-253-5265 Fax. 84-43-253-5265

United States

HANYANG ENG USA Inc.
12100 Samsung BLVD SUITE 100 Austin TX 78754, U.S.A

Singapore

HYE Global PTE., Ltd
3 Shenton Way #16-08, Shenton House Singapore

Affiliates

HCM Co., Ltd.

332-7, Samsung 1-ro, Hwaseong-si, Gyeonggi-do
Tel. 82-31-204-4330 Fax. 82-31-695-0195
http://www.hcmkorea.com

CTP Korea Co., Ltd.

332-7, Samsung 1-ro, Hwaseong-si, Gyeonggi-do
Tel. 82-31-202-3734
http://www.ctpkorea.com

※ CV & PV Business Unit separately operated

DINNO Co., Ltd.

D-810, 357, Guseong-ro, Giheung-gu, Yongin-si, Gyeonggi-do
Tel. 82-31-229-3040
http://www.d-inno.co.kr

Partners

HANYANG Digitech Co., Ltd.

332-7, Samsung 1-ro, Hwaseong-si, Gyeonggi-do
Tel. 82-31-695-5000
http://www.hanyangdgt.com

