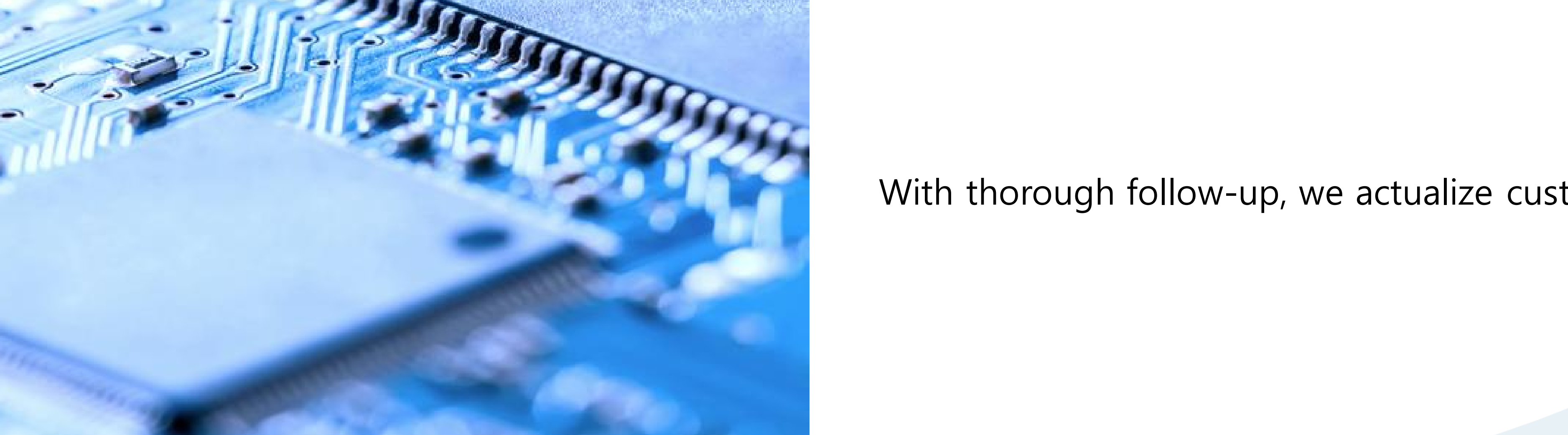
Company Profiles



With thorough follow-up, we actualize customer value

Company Profile, Back-ground

Business Back-ground

❖ **Man-power**

- Consisting of **Specialized engineers & Auxiliary engineers** **of the facility area** in the semiconductor, display and solar industries
- **Design & Construction** for **Fab Clean room and UT hook-up**
- **R&D and Manufacturing** for **GCS**(Gas & Chemical Supply)System, **Abatement(Scrubber system)** and **PDS**(Precursor delivery system)

Clean room & UT Hook-up

❖ **NEO Goal**

- **Improving the performance** of the **GCS, PDS & Gas abatement system**, **presenting the new development plan**, and **doing OEM manufacturing**
- Developing and applying the various accessories related to the corresponding system
- Specializing in doing the clean room and UT construction work and in providing the design and construction service for a new research project

LDS System

GCS Systems

Abatement Scrubber

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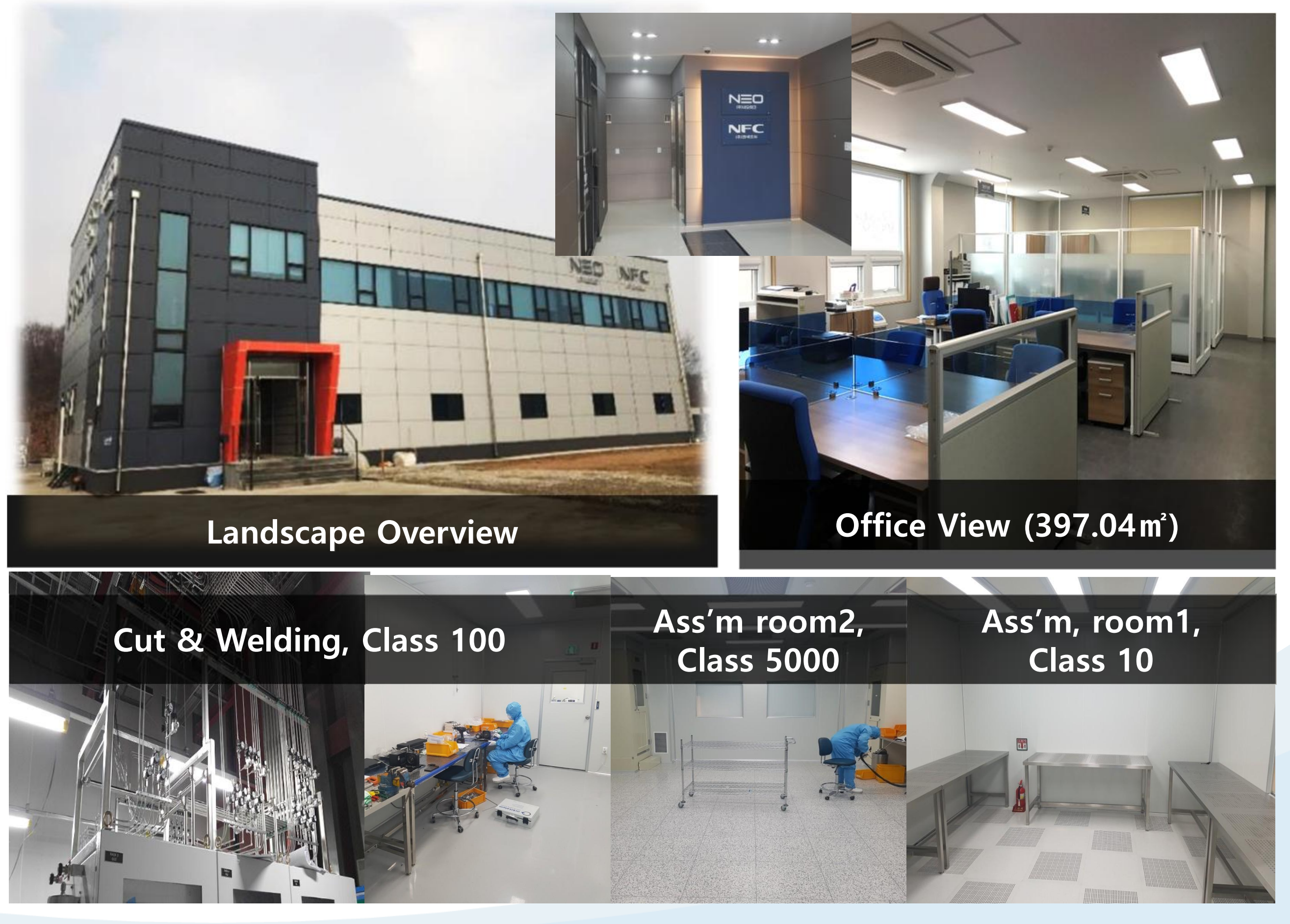
Company Profile, General

General information

Company	**NEO Tech Co., Ltd.**
CEO	**KS Koh and JJ Oh**
Established	**2013. April**
Capital	**$8 million**
Business	Manufacturing of system (Semiconductor, Display) Construction of Clean room, UT and Facility Fab feature
Contact	+82-31-275-1990
Address	15-29, Dokjeom-ro 113 beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea



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Company Profile, History

Facility Total solution

Start-up (2013~2014)	Settle-down (2015~2018)	1st Jump-up (2019-2021)	2nd Jump-up (2022~)
OEM Vendor (Abatement system)	Outsourcing (SCR', GC, VMB, PF..)	Own tech-manufacturing, R&D(GCS, LDS, SCR'), others	Total solution for the facility infra with acceptable system installation

Start-up (2013~2014)

- Estabilished Neotech,co.ltd
- Vendor registration
- (CSK: Local 1st vendor to SAMSUNG SEMI)

-> Start OEM Manufacturing

- FIS, CCSS Manufacturing & Supply Contract
- ISCONTEK, Canister Supply Contract
- UJINTECH, Gas Line Piping Contract
- Sungdo ENG, Partner Registered
- Yeonsae Univ, Nano Fab Piping contract

Settle-down (2015~2018)

- YEST, Partner registration
- NANOSEMICON, Partner registration Top ENG, Partner Registered
- LIG, ADP Piping Contract
- KODENSHI, Piping Contract
- Jeonbuk National University Hospital, Semi Conductor Laboratory Piping Contract
- Shinsung Solar, Energy Partner Registered
- Hanhwa Q-Cell, Partner Registered
- Management Innovation Business Company Selected
- Excellent Technology Evaluation Company Selected
- New office relocation
- Vendor Registered (KC, Wonik Holdings: Local 1st vendor to SAMSUNG SEMI)

-> Start outsourcing (GC, VMB, SCR')

- Korea Techno, Partner Registered

1st Jump-up (2019-2021)

- Gas Cabinet Acquired licenses and manufacturing qualifications
- Wonik Holdings, Purifier & VMB Production Contract
- TMA ARS New Product Development
- LDS Line-up and Completion of self-production system establishment
- HITACHI, Partner Registered
- PSK, Partner Registered
- Built-in fire extinguisher development and delivery contract
- Miraebo, Pipe construction and gas cabinet supply contract
- MECARO, Pipe construction and gas cabinet supply contract
- Gas Acquisition of 1st class license for plumbing construction

2nd Jump-up (2022~)

- M&A(NFC: Design, sales, service part) Establishment of unification system
- Plasma scrubber, Mass production and delivery of self-developed products (SVC, Seoulviosys)
- LDS (TMA, ZR ARS & TCS Vapor system etc) Mass production and delivery of self-developed products(DBHITEK, Magnachip, Hanhwa Q-Cell.)
- Clean room In-house design and construction progress
- NANO-X Korea, C/R 450m2 Construction
- Lake materials, TBA Production building construction contract
- TEMC, B2H6 Participated in the construction of the production building

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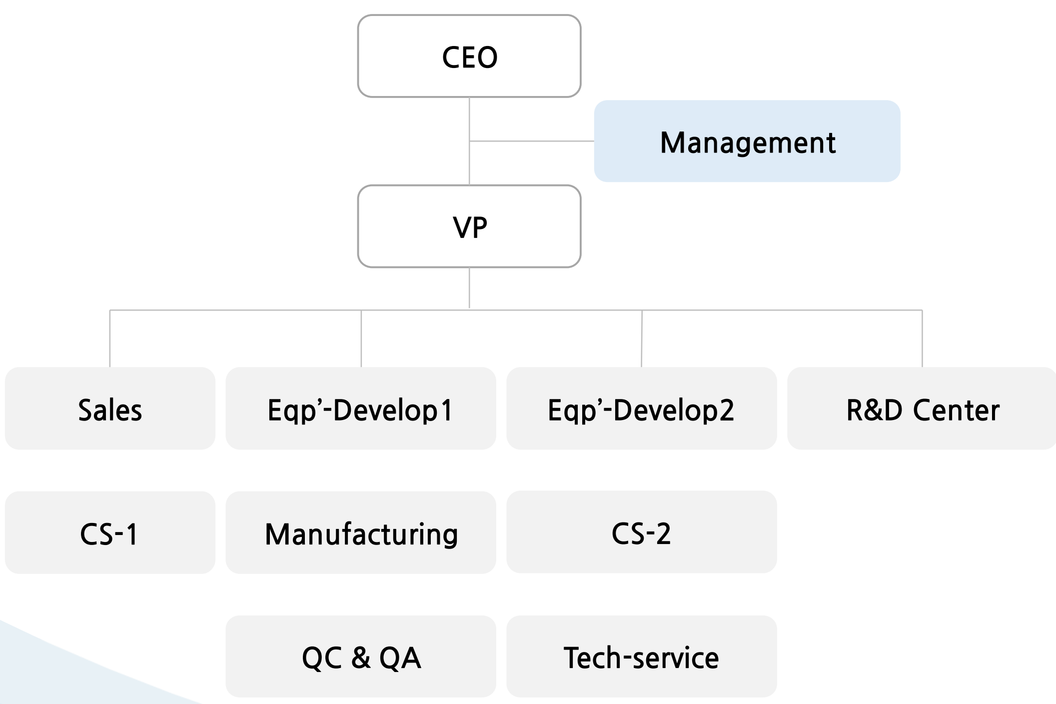
Company Profile, Organization

Organization



R&D		6
DESIGN (Hardware & Software)		4
Manufacturing	Control	3
	Manufacturing	14
SALES		5
Quality control		3
CS		8
TOTAL		43 Persons

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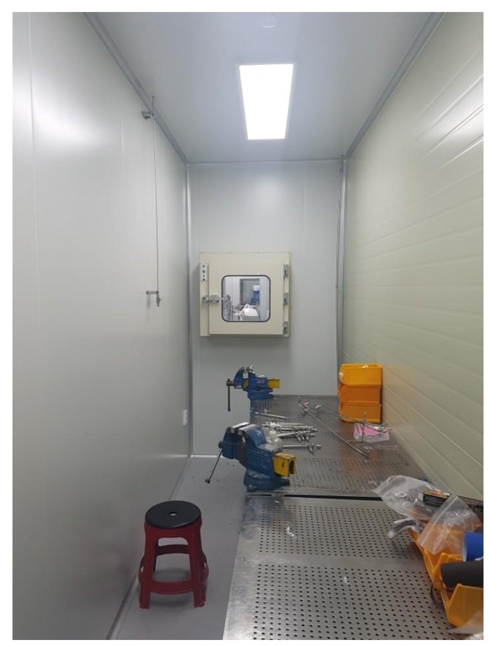
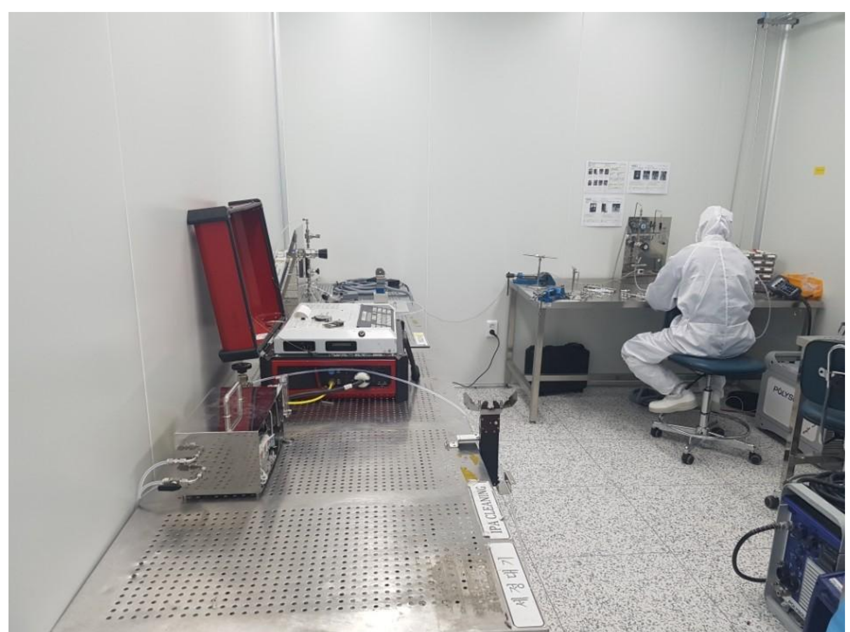
Company Profile, Capability

Capability _ Manufacturing facilities

- The clean room separated for each class on the basis of the work step for improving and maintaining product quality





- Cutting room:
  - Class 5,000
  - Tube cutting zone

- Cleaning room:
  - Class 20,000
  - Brushing, Cleaning zone

- Welding room:
  - Class 100
  - Auto & Manual welding zone

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Company Profile, Capability

Capability _ Manufacturing facilities

- The clean room separated for each class on the basis of the work step for improving and maintaining product quality

- Assembly room #01:
  - Class 10
  - Valve panel assembly zone

- Assembly room #02:
  - Class 5,000
  - Cabinet assembly & Qualify zone

Company Profile, Capability

Capability _ Manufacturing machine

- Manufacturing machine to improve and maintain product quality

No	Title	Spec	Q'ty	Maker	Remark
1	Auto Welding Machine	P-4	2	POLYSOUDE	Ar special welder
2	Auto Welding Machine	PS-164	1	POLYSOUDE	Ar special welder
3	Auto Welding Machine	D-100	1	Swagelok	Ar special welder
4	O2 Analyze	DF-310E	1	SORVOMEX	oxygen gauge
5	H2O Analyze	DF-745	1	SORVOMEX	moisture gauge
6	Particle Analyze	SOLAIR-100	1	LIGHTHOUSE	micro/nano particle gauge
7	Purifier	PS5-MG50-WG-1	2	GETTER	gas purifier
8	Leak Detector	ASM-340	1	ADIXCEN	He Leak TEST Machine
9	Stain Brite	TM-805	2	TAHOIND	small electrolytic grinder
10	Mo-Tube Cutter	STEC 200	2	IHARA	tube cutter
11	Mo-Cutter System	EL-400	1	NEO	digital precision sizer
12	Try Tool	TRY TOOL	2	BOSCH	tube section processor
13	Auto Bending Machine	DW25CNCX3A-1S	1	BESTMACHINE	automatic banding device

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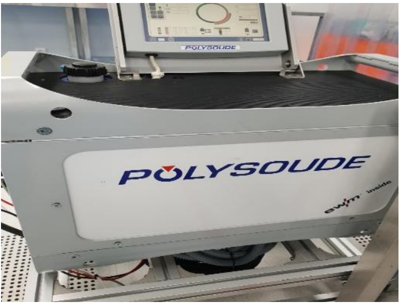
Company Profile, Capability

Capability _ Manufacturing machine

- Manufacturing machine to improve and maintain product quality

Auto Bending Machine



Auto Welding Machine

Auto Welding Machine

Auto Tube cutter

Digital Electric Polisher

Manual pipe cutter

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Company Profile, Capability

Capability _ Manufacturing machine

- Manufacturing machine to improve and maintain product quality

O2 Analyzer
DF-310E
oxygen gauge

He Leak Detector
He Leak
gauge

H2O Analyzer
DF-745
moisture gauge

endoscope for measuring
Oxidation inside pipes

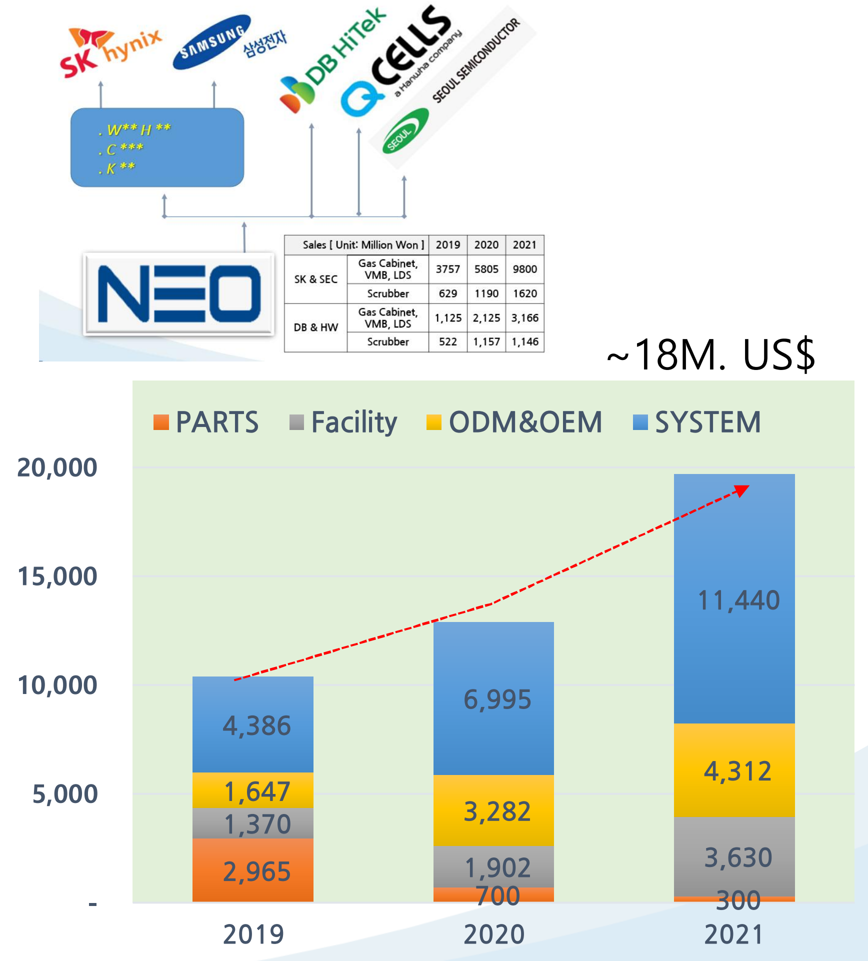
Particle Analyzer
SOLAIR-100
Micro / Nano
particle gauge

and various
Torque gauges

Company Profile, Sales record

Sales revenue

Items			2019	2020	2021
SYSTEM	LDS	DTLR	560	1,253	2,200
		ARS	621	1,355	1,942
	Gas cabinet	2B&1P,2P/1B&1P,2P	1,840	2,369	4,669
	VMB	1*10/ 1*8	736	828	989
	SCR'	DRY	210	465	652
		P&W	419	725	988
PARTS	Fire Extinguisher	One body	2,855	400	100
		Unit type	110	300	200
Facility construction		Clean room	822	1,156	2,466
		UT Hook-up	548	746	1,164
OEM,ODM Manufacturing		Gas Cabinet, LDS	1,125	2,125	3,166
		Scrubber	522	1,157	1,146
			10,368	12,879	19,682



Sales [Unit: Million Won]		2019	2020	2021
SK & SEC	Gas Cabinet, VMB, LDS	3757	5805	9800
	Scrubber	629	1190	1620
DB & HW	Gas Cabinet, VMB, LDS	1,125	2,125	3,166
	Scrubber	522	1,157	1,146

Business & Products

With thorough follow-up, we actualize customer value

Contents

I. LDS (Liquid Delivery System)
- Solvent purge type
- N2 purge type

II. Gas cabinet

III. VMB & Gas panel

IV. Fire Extinguisher

V. Scrubber

VI. Clean room design & UT hook-up

VII. Field service plan

Business Area, facility system(LDS)

GCS system – LDS

Solvent Purge Concept
Application: TMA, Zr, Hf

N2 Purge Concept (DTLR)
Application: TEOS, TiCl4, BDEAS, HCDS…

N2 Purge Concept
Application: PoCl3

Vapor system
PCW Concept
Application: TCS for EPI

Gas mixing system
Concentration control
Application: B2H6

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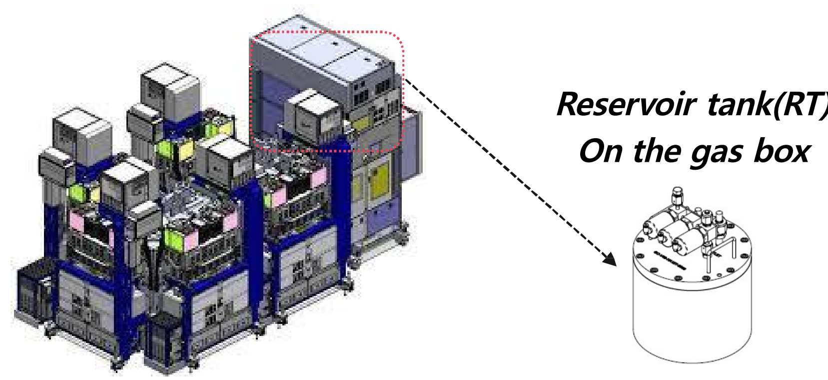
Business Area, facility system(LDS)

1-1) Why PDS cabinet is needed?



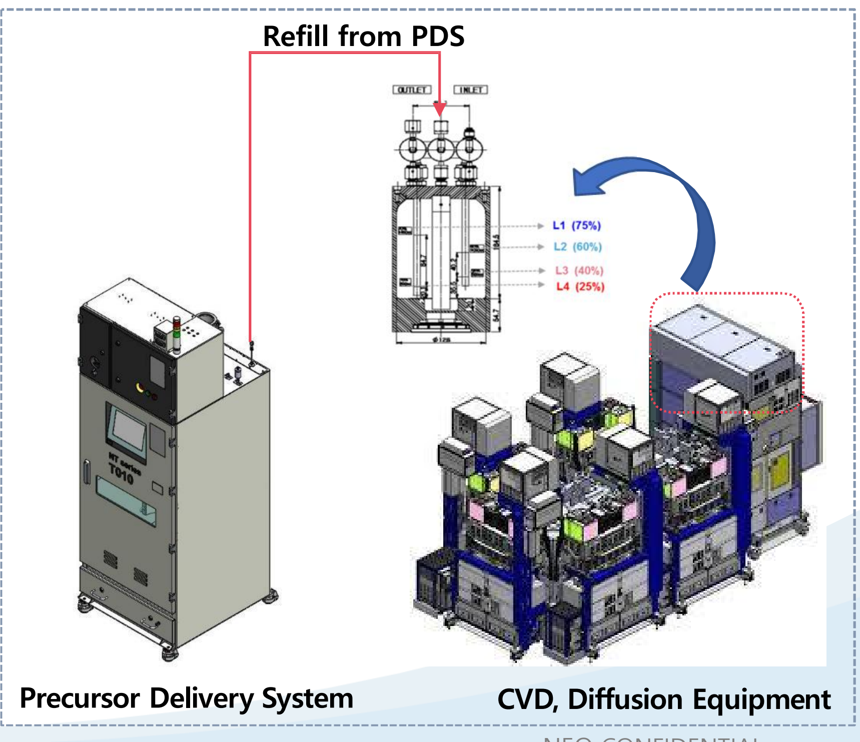
❖ Install RT(Reservoir Tank)

- When RT is empty, RT exchange is necessary
  - Down time ☞ Production stability
  - Waste precursor ☞ Cost
  - Manual Exchange ☞ Safety issue
  - Work-load & human error

PDS Application

❖ Improvement of production & safety

- No down time production stability
- No waste of precursor (cost reduction)
- Safety improvement & risk reduction



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Business Area, facility system(LDS)

1-2) Flow diagram: Depends on Deposition type

Type	Direct injection	Bubbling
Flow Diagram	Carrier gas liquid phase LFC Vaporizer vapor phase Reaction Chamber Main Equipment	Carrier gas MFC liquid phase vapor phase Reaction Chamber Level sensor Main Equipment
Description	▪ LFC and Vaporizer will be installed inside main equipment for injection ▪ Used precursor: TEOS, HCDS, LTO520 (push gas_ He or N2)	▪ Bubbler tank will be installed inside main equipment for vaporizing ▪ Gas flow rate is controlled by MFC ▪ Used precursor: TiCl4, TDMAT (push gas_ He or Ar)

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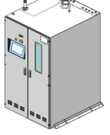
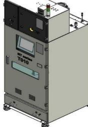
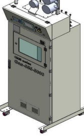
Business Area, facility system(LDS, Solvent purge concept)

1-3) Application by purge method

LIST	Solvent purge	Gas purge only
Applied precursor	- High-K material: TMA(Tri-Methyle Aluminium) Zr source(TEMAZr, ZyALD and so on), TEMAHf - Metal: USN-1	- SiO2: TEOS, HCDS, DIPAS, BDEAS, BTBAS and so on - Low-K: 4MS, OMTCS, ATRP & etc - Metal: TiCl4, TDMAT - ACL H/M: 1-Hexane - Highly flammable(pyrophoric): TMA
Properties	Low vapor pressure precursors	High vapor pressure precursors Pyrophoric precursors
Purge method	***Purge gas*(N2) + *solvent* (ECH, Octane)** * Solvent used for completely cleaning out the precursor delivery line before canister exchange	***Only purge gas* (N2)**

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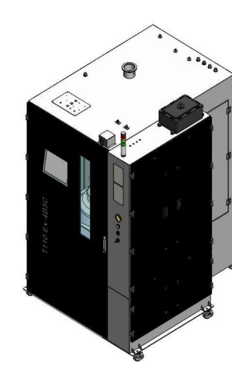
Business Area, facility system(LDS, Solvent purge concept)

2-1) Solvent Purge concept



TMA ARS

❖ Description

- ARS supply system is a system that supplies high-purity process precursors by branching them into several parts.
- ARS continuously supplies liquid(with stabilized pressure) to CVD and DIFF process tools.

❖ Application

- TMA (TriMethyl aluminum)
- TEMAHf/Zr (Tetrakis(ethylmethylamino) hafnium/ zirconium)
- SSP (Cyclopentadienyl-tris(dimethylamino)zirkonium)

❖ Cabinet Concept

- Solvent purge mechanism
  a. Low vapor pressure, High plash point
  b. Lower than 2ppm after purge
- Switch over concept : canister: 4~19L charge/
  - Explosion Proof Certification

	N2 Purge concept				Solvent Purge concept	
DRAM	TEOS	TEB	TEPO	BDEAS(SAM24)	TMA	USN-1
	LTO520	DIPAS	LTS525	LTO770	ECH	HPK1
	LTS525	LTO770	HCDS	ATRP	SFA-1	ZAC
	HCDS	ATRP	AM16	4MS	Star-ti	ZM40
	TMSA	TMGa	TDMAT	TDMAS	TEMAH	TANTALUM
	Tics	ALFA4S	Silcore	Ticl4	SIA-3	HTB
	TEDDY	RENA	SFA-1	ABA	CP-Hf	ACP-2
	IPA	Pyridine	2NTE	Tris-DMAS	TDMAS	SP-3 (Hf)
	AP(new)	Yamuna(new)	-	-	-	-
NAND	TEOS	TEB	TEPO	LTO520	TMA	ACP-2
	DIPAS	HCDS	OMTCS	4MS	USN-1	ZAC
	TDMAS	Ticl4	SFA-1	Pyridine	ZM40	Star-ti(Zr)
	2NTE	-	-	-	-	-
Logic	TEOS	TEB	TEPO	LTO520	TMA	TEMAH
	HCDS	ATRP	MDEOS	DEMS	HPK1	HTB
	OMTCS	4MS	TMSA	TDMAT	-	-
	ALFA4S	Ticl4	-	-	-	-

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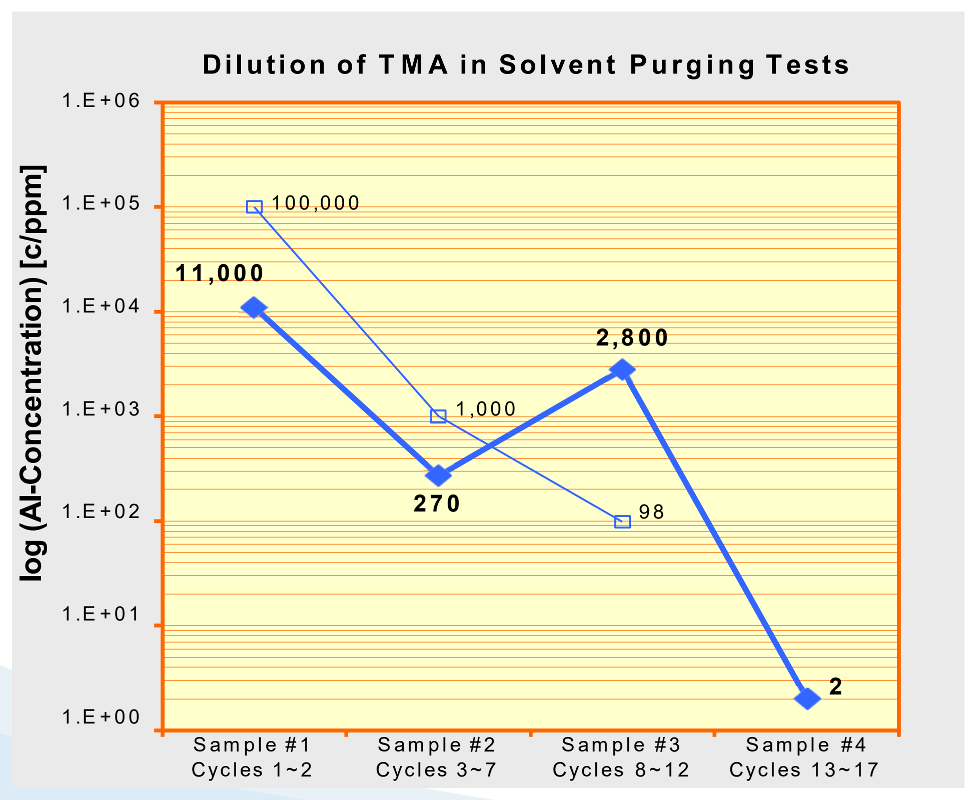
Business Area, facility system(LDS, Solvent purge concept)

2-2) Solvent Purge mechanism

- **Solvent purging evaluation test Result : After only 12 cycles, the TMA-Purge is completed**



- Interface Dead Volume $1cm^3$ was filled with 100% TMA.
- 1cm3 of TMA was drained to the waste tank.
- 2 hexane purge cycles were performed and the solvent waste collected into sample #1.
- Cycles 3~7, 8~12 and 13~17 were collected into samples #2, #3 and #4.
- The samples were analyzed by ICP-AES for their Al-content (2 ppm detection limit).
- Another test yielded a similar result

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Business Area, facility system(LDS, Solvent purge concept)

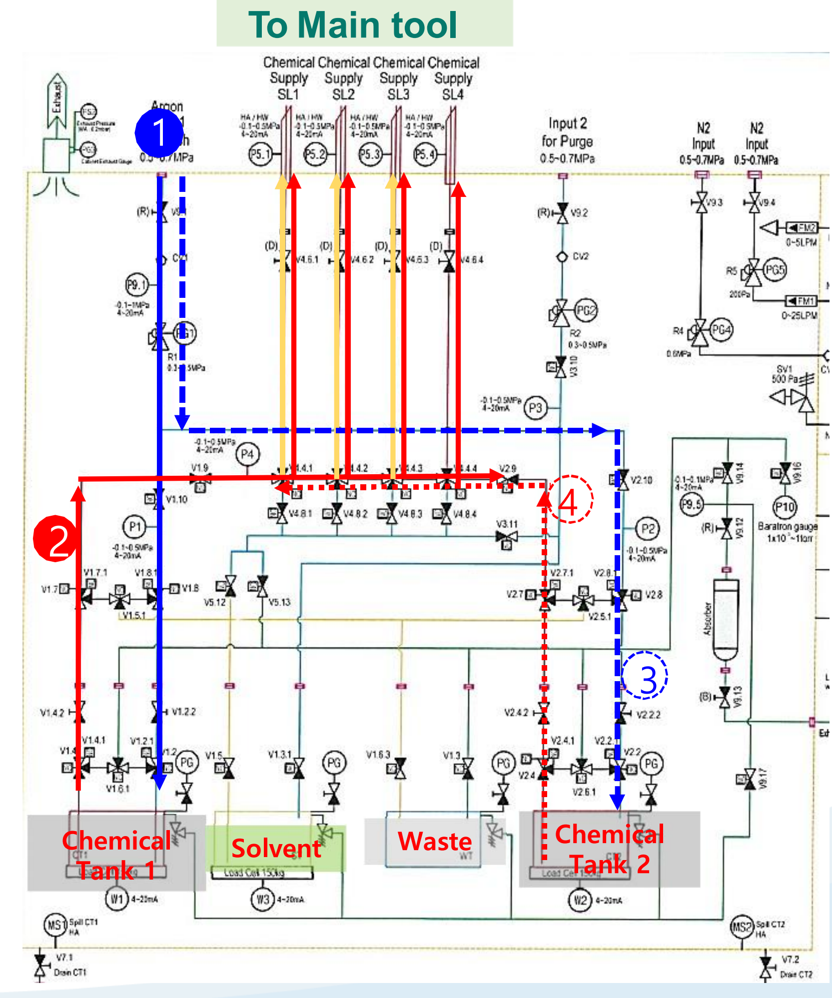
2-3) Precursor delivery

- Precursor is delivered to reservoir tank
  (No. of branches are Max. 4ea)
- Push gas : Ar, He, PN2
- Purge gas : PN2

- ① Push the CT1, **precursor in CT1** is delivered to Reservoir tank on main tool through ②
- ③ Push the CT2, **precursor in CT2** is stand-by to delivery through ④

- When empty **CT1,** chemical line is changed **CT2** by automatically

- Purge sequence is progressed using solvent and purge gas. Then, exchange empty canister



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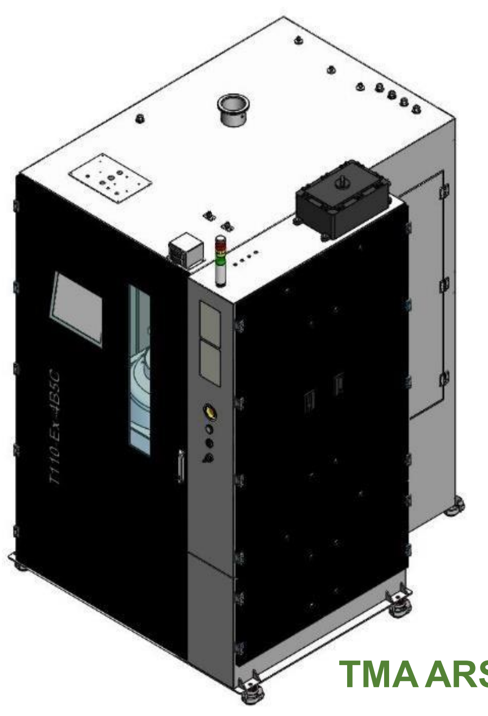
Business Area, facility system(LDS, Solvent purge concept)

2-4) The other concept

- Bulk to process refill concept
- Bulk canister exchange only (refill to process canister)



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Business Area, facility system(LDS, Solvent purge concept)

2-5) Specification

1. Basic Design			
Section	Item	Spec	Remark
Hardware	Dimension	W : 1,350mm , D : 1,600mm, H : 1,900mm	Detail: Refer to Parts Specification
	Stick No.	4 stick	
	Canister volume	TMA: 4~19 Dual, Solvent: 14L, Waste: 14L	
	Valve	Seat : PCTFE, 1/4" SUS-316L Double melt	
	REGULATOR	Seat : PCTFE, 1/4" SUS-316L Double melt	
	Internal Tubing	1/4" SUS-316L Double melt	
	Viewer Glass	Heat resisting, See inside Cabinet	
Delivery concept & Canister Change concept	Delivery concept	CT1, CT2 TO R/T Refill	
		Continuous supply by interface with tool	
	Change Concept	Solvent Clean & Cycle purge	
	Leak Check	Pressurizing: 60min, Depressurizing: 20min / Spec.: set point ±2kpa	
	Clean Spec. for Canister Change	Solvent Cleaning : keeping 10min/10cycle	Refer to exchange sequence
		purge cycle : 100cycle (Push : 10sec, Vent: 20sec)	

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Business Area, facility system(LDS, Solvent purge concept)

2-5) Specification

2. Safety & Sensor			
Section	Item	Spec	Remark
Safety Device	Gas Sensor	O2 Gas Detector, Maker: GDSDNA Smoke Detector (Air Sampling, :VESDA) Optical Liquid Spill Sensor	
	Fire Extinguisher	FM200, CO2 (Included UV-IR, Temp. sensor)	
	Spill Sensor	Photo Electric Liquid Spill Sensor	Basic
	N2 Showering	N2 shower is ON as over than 1000slm	Option
	EMO Button	Shut down main power in Emergency status	
	Catch Pan	Catch the spilled chemical	Option
	Protect Electric Zone	Isolation from other zone by SUS lack	Isolation Zone
	Pneumatic tubing	Nonflammable (FEP)	Prevent Fire diffusion
Sensor	Level sensor	Weight Scale (0~200kg) & Ultra sonic point sensor (Optional)	
	Pressure Transmitter	Pressure Transmitter (0 kpa ~ 630 kpa), pressure reading	
	Vacuum Sensor	Digital Vacuum Sensor(0~630 kpa), Set Interlock (alarm)	
	Pneu. Pressure Sensor	Pneumatic Pressure Sensor (-14.5 ~ 65 psig), Check t he Pneumatic pressure	
	Door proximity switch	Distance 5mm	
	Cabinet Exhaust	Digital Differential Pressure gauge	

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Business Area, facility system(LDS, Solvent purge concept)

2-5) Specification

3. Control & Monitoring			
Section	Item	Spec	Remark
Control	PLC	Omron PLC	Easy to modify
	Touch Screen	12.1" Color Touch Screen.	
Monitoring	CMS	PLC Ethernet	Check system status
	Signal Tower	Red,Yellow,Green 3Color Lamp	Check system status

4.Main Equipment & Maintenance			
Section	Item	Spec	Remark
Main Equipment	Maker	KE, GENUS, IPS , TEL	
	Process Type	VFC(Vapor Flow Control)/ ?	
	LFM maker	N/A	
	Vaporizer maker	N/A	
	Refill Contorl	Low : Refill Start, High : Refill Stop	
	Interface with Supply	Refer to Interface diagram	
Maintenance	CF memory card	512M Byte	History Data back-up.
	Flexisible bellows	Connecting point for recycle canister	Easy to exchange canister
	Alarm	Alarm / Warning 2step	
	Residue Control	Set Parameter	
	Purge efficiency	Individual stick purge	
	Display	Refer to P&ID	

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Business Area, facility system(LDS, Solvent purge concept)

2-6) Utility connection

Anchor Hole
6-Φ16

Vacuum
STS Tube 1/4", STS316L

75
896
345
653
1600
855
1350

Chemical Outlet SL1~4
STS Tube 1/4", STS316L
Double Piping(1/2" Stove)

PN2 for Purge
STS Tube 1/4", STS316L

PN2 for Push
STS Tube 1/4", STS316L

Exhaust
MP100 Flange, STS304

Vent
STS Tube 1/2", STS316L

GN2 for Pneumatic
1/4" Bulkhead Union

GN2 for Z-purge
1/4" Bulkhead Union

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Business Area, facility system(LDS, N2 purge concept)

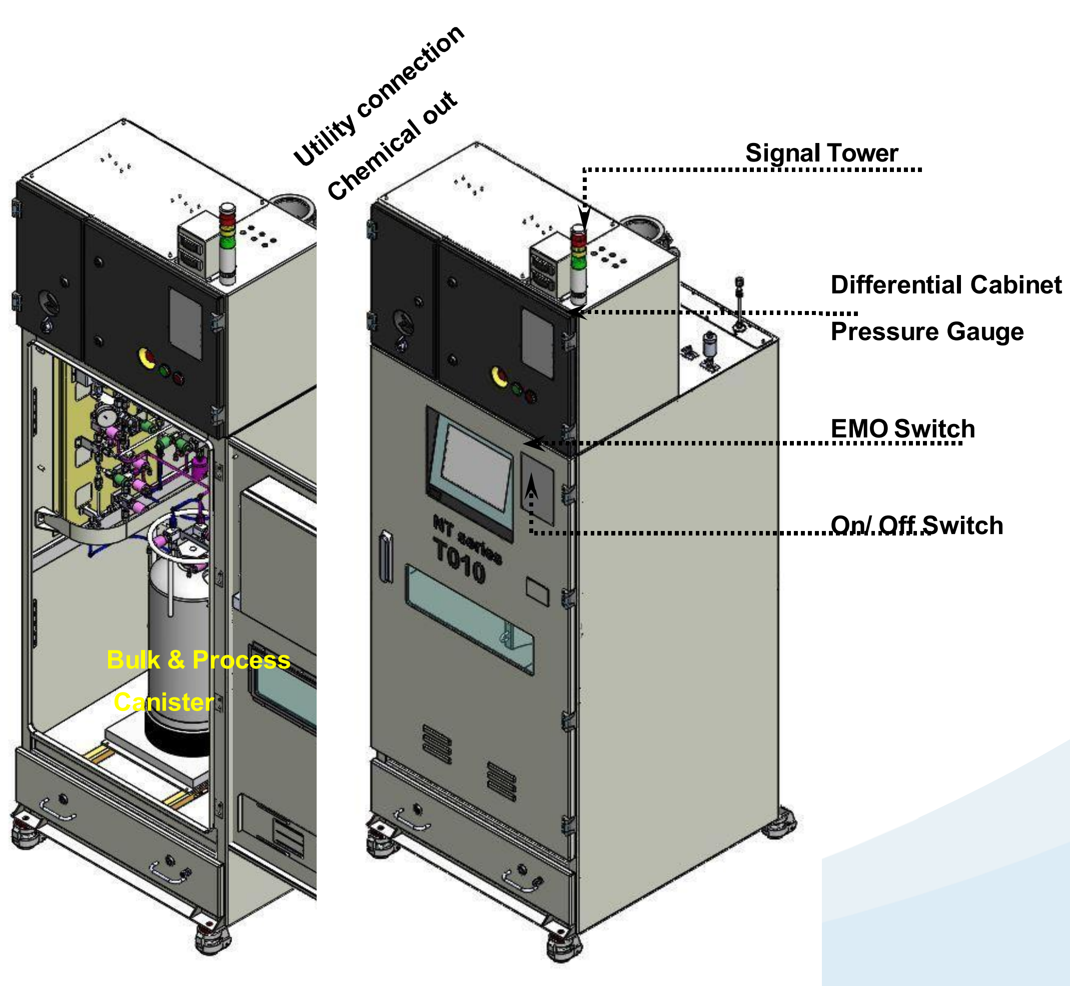
3-1) N2 Purge concept

❖ Description

- The DTLR supply device distributes and refills high-purity process precursors to several main equipment chambers by an automated system.
- N2 continuously supplies liquid(with stabilized pressure) to CVD and DIFF process tools.
- DTLR is an automated system by PLC Controller that manages Bulk Canister Changes and Automatic Refill, and is a precursor supply device with various functions and future stability.

❖ Application

- Direct Injection Type : BTBAS, TEOS, TEPO, TEB, LTO520, C6H12 (1-Hexane), HCDS (Hexachlorodisilane), Alfa-4 {Isoprene (2-methyl 1,3 butadiene)}
- TiN Source: $TiCl_4$ (Titanium Tetrachloride), TDMAT(TETRAKIS(DIMETHYLAMINO)TITANIUM)
- Low-K: TMCTS, 4MS
- Solar-Cell Business : DEZ (Diethyl Zinc)



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Business Area, facility system(LDS, N2 purge concept)

3-2) P&I Drawing

Business Area, facility system(LDS, N2 purge concept)

3-3) Specification

1. Basic Design			
Section	Item	Spec	Remark
Hardware	Dimension	W : 650mm , D : 796mm, H : 2,227mm	Detail: Refer to parts Specification
	Stick No.	4stick	
	Canister volume	Bulk 19L(chemical supplier) , Process 19L(NFC)	
	Valve	Seat : PCTFE, 1/4" SUS-316L Double melt	
	REGULATOR	Seat : PCTFE, 1/4" SUS-316L Double melt	
	Internal Tubing	1/4" SUS-316L Double melt	
	Viewer Glass	Heat resisting, See inside Cabinet	
Delivery concept& Canister Change Concept	Delivery concept	Bulk to Process tank Refill concept Process tank-> Main equipment : Continuous supply by interface with tool	Refer to exchange sequence
	Change Concept	PN2 Cycle purge	
	Leak Check	Pressurizing: 60min, Depressurizing: 20min / Spec.: set point ±2psig	
	Clean Spec. for Canister Change	purge cycle : 300cycle (Push : 5sec, Vent: 30sec)	
Utility	Push Gas	80~100psig (Liquid push and Supply), ¼" VCR Female (He,Ar,N2 Choice)	Refer to Utility connection drawing
	Purge Gas	PN2 : 80~100psig (Line purge), ¼" VCR Female	
	Pneumatic Gas	GN2 : 80~100psig (or SN2), ¼" Bulkhead Union	
	Chemical Supply	Chemical Supply Line, (1/4" VCR female)	
	Vacuum Line	1/4" VCR female	
	Exhaust Line	MF100	
	Power	220V, 10A, 1Phase	

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Business Area, facility system(LDS, N2 purge concept)

3-3) Specification

2. Safety & Sensor			
Section	Item	Spec	Remark
Safety Device	Gas Sensor	Optional: HCL Gas Detector, Maker: GASDNA	
	Spill Sensor	Photo Electric Liquid Spill Sensor	Basic
	EMO Button	Shut down main power in Emergency status	
	Fire Extinguisher	Solid Aerosol with UV-IR, Temp. sensor	
	Protect Electric Zone	Isolation from other zone by SUS lack	Isolation Zone
	Pneumatic tubing	Nonflammable (FEP)	Prevent Fire diffusion
Sensor	Level sensor	Weight Scale (0~200kg) & Ultra sonic point sensor (Optional)	
	Pressure Transmitter	Pressure Transmitter (-14.5psig ~ 75psig), pressure reading	
	Pneu. Pressure Sensor	Pneumatic Pressure Sensor (0.4Mpa), Check the Pneumatic pressure	
	Door proximity switch	Distance 5mm	
	Cabinet Exhaust	Digital Differential Pressure gauge	

NEO CONFIDENTIAL

Business Area, facility system(LDS, N2 purge concept)

3-3) Specification

- Touch screen

▶ Status Bulk & Process

▶ Connected Main equipment

▶ Signal Interface with main tool

▶ Weight Display

▶ Turn on lamp in Cabinet

▶ Manual valve operation

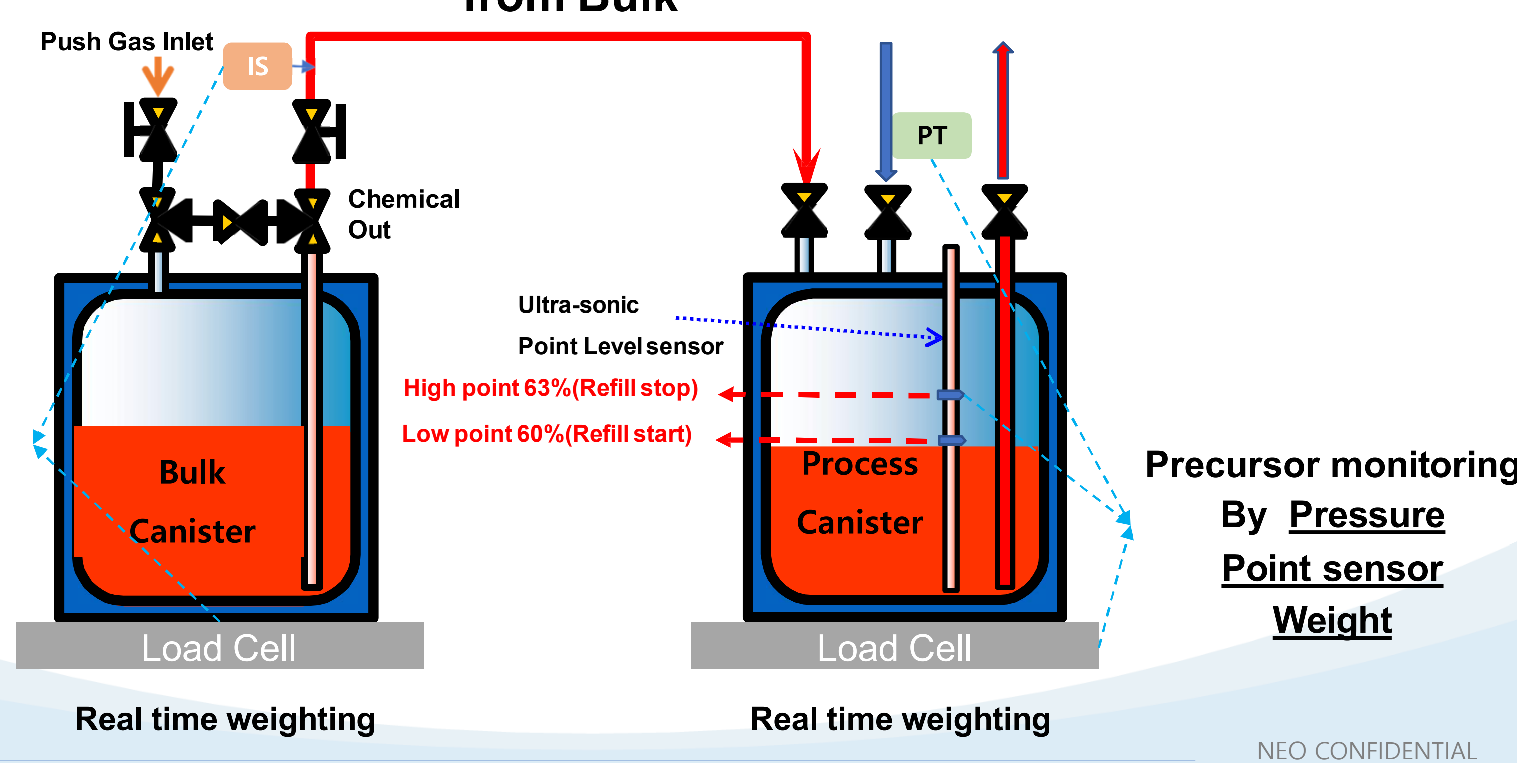
NEO CONFIDENTIAL

Business Area, facility system(LDS, N2 purge concept)

3-4) Refill control

- Refill control from Bulk to Process canister by using point level sensor(60~63%)
- Empty Leading: Load cell & Ultra-sonic inline sensor

Minimized precursor waste
By
<u>In-line sensor & Load cell</u>



Precursor monitoring
By <u>Pressure</u>
<u>Point sensor</u>
<u>Weight</u>

NEO CONFIDENTIAL

Business Area, facility system(LDS)

❖ Sales record

Purge Concept	Process Group	Precursor	Quantity	Customer
N2 Purge “DTLR”	Thin Film	TEOS	147	SamSung Semiconductor Skhynix HanWha Q-CELL ShinSung ENG Magnachip-Korea MEMC GAS FLOW IN NOSCIENCE MI RAE-BO ON-S EMI DBHITEK
		TDMAS	11	
		TiCl4	73	
		TDMAT	12	
		LTO520	58	
		BDEAS	40	
		OMCTS	12	
		DIPAS	8	
		ATRP	28	
		TEPO	78	
		TEB	74	
		HCDS	53	
	EPI	TCS	27	
Solvent Purge “ARS”	DIFFUSION	TMA	48	
		TEMAZr	34	
		TEMAHf	12	
		CP-Zr	11	

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Business Area, facility system(Gas Cabinet)

GCS system - Gas Cabinet

GC(Gas Cabinet) is the equipment manufactured according to the safety standards of the **SEMI standard and CE-MARK** and is the safe gas supply equipment supplying the fixed quantity of the toxic, corrosive, flammable, and inert gas charged with high pressure for use in the semiconductor manufacturing process with the fixed pressure to the main facility, preventing diffusion in case of a gas explosion accident, and automatically blocking and discharging gas in emergency.

특정설비 제조 등록증명서

①사업의 종류	특정설비		
②상 호	(주)네오테크		
⑥용기.냉동기.특정설비	종 류	규 격	
	특정설비	고압가스용 실린더캐비닛	

「고압가스 안전관리법」 제5조제1항, 제5조의2제1항 또는 제2항과 같은 법 시행규칙 제6조제1항제3호에 따라 용기(냉동기 · 특정설비)의 제조등록 또는 재등록을 마쳤으므로 용기(냉동기 · 특정설비)제조 등록증명서를 발급합니다.

2019 년 03 월 11 일

용 인 시 장

Classification	Detailed Spec
Case Material	SS41 2.3t
Explosion-proof glass Safety Glass	core-reinforced glass 6.7t~8t (Defence film Option)
Exhaust Damper	4" (STS304)
Controller (Option Select1)	Manual / Semi Auto / Full Auto
Painting	Structure Powder (powder heat treatment)

Gas cabinets in Korea can only be manufactured by companies with "specific facility manufacturing registration certification" under the domestic high-pressure gas safety regulations.

Cylinder	Dimension(mm)
1 Bottle	500 X 550 X H2000
2 Bottle	800 X 550 X H2000
3 Bottle	1200 X 550 X H2000

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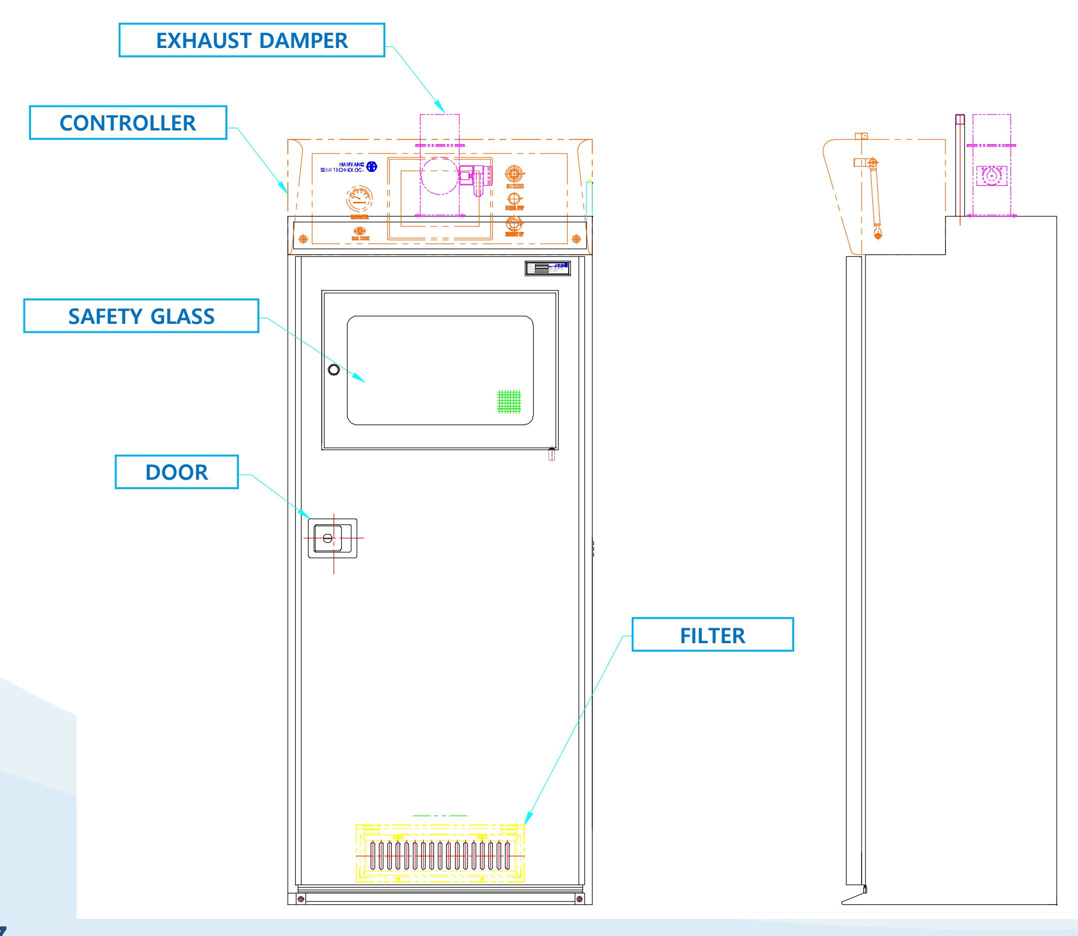
Business Area, facility system(Gas cabinet)

1-1) Gas cabinet enclosure Box



Classification	Detailed Spec
Case Material	SS41 2.3t
Explosion-Proof Safety Glass	Iron cored tempered glass 6.7t~8t (protective film Option)
Exhaust Damper	4" (STS304)
Controller (choose 1 among 3types)	Manual / Semi Auto / Full Auto
Painting	Structure Powder (Powder Heat Treatment)

Cylinder	Dimension(mm)
1 Bottle	500 X 550 X H2000
2 Bottle	800 X 550 X H2000
3 Bottle	1200 X 550 X H2000

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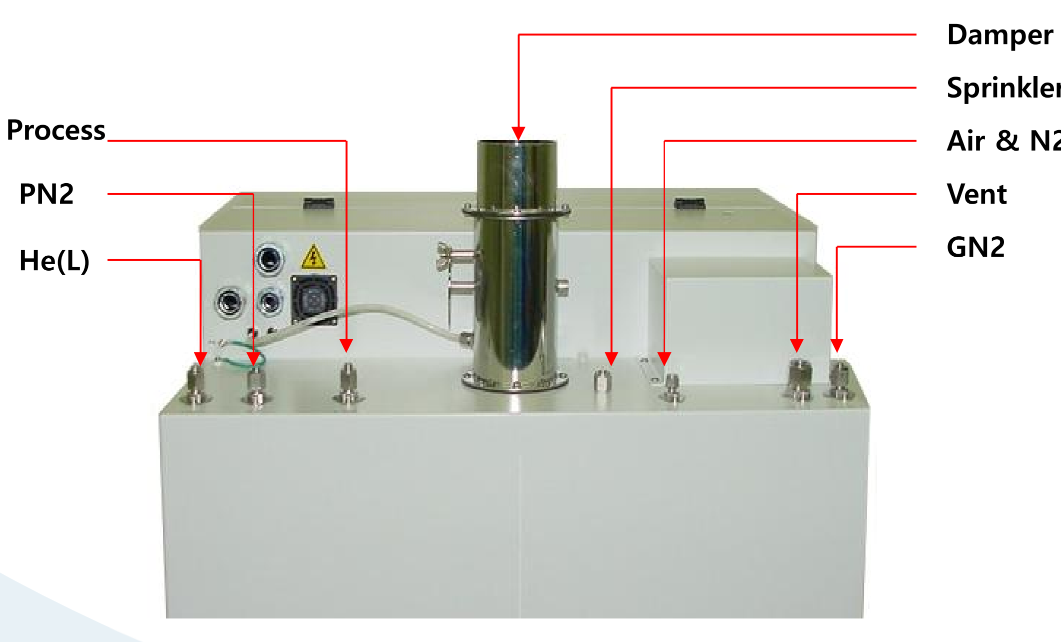
Business Area, facility system(Gas cabinet)

1-2) Gas cabinet, system utility



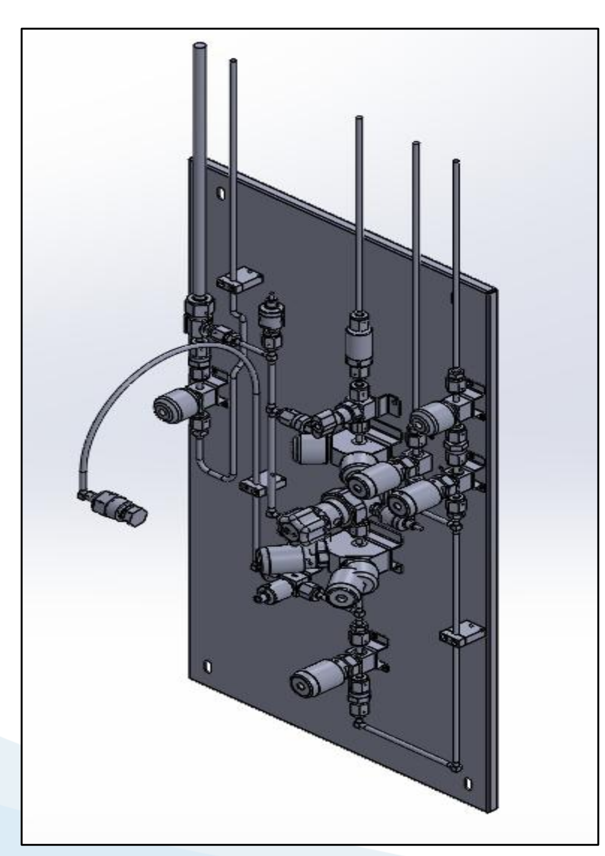
- Port position and material can be changed by customer required configuration - specification.

분 류	Size	Type	Flow rate	Remark
Purge N_2	1/4"	TUBE,VCR	45~60 LPM	For Purge (75~95PSI)
Power				UPS,AC,220V,3Am
Leak check He	1/4"	TUBE,VCR		More than1500PSIG
Process	1/4"~1/2"	TUBE,VCR		
Damper	Φ100~Φ150	DUCT	140~195 cfm	10~20 mmH2O
Sprinkler (Option)	1/2"		32 GPM	31PSI
Air & N2 Supply	1/4"		30~45 LPM	Valve for driving (60~80PSI)
Vent	½"~3/8"	TUBE VCR	50~60 LPM	
General N_2	1/4"	TUBE VCR	50~60 LPM	For Venturi (60~100PSI)

NEO CONFIDENTIAL

Business Area, facility system(Gas cabinet)

1-3) Gas panel



Part`s	Material	Rough ness
Regulator	SUS316L DM EP Or EP	RMAX :〈0.7㎛ Ra : 5u in
Valve	SUS316L DM EP Or EP	RMAX :〈0.7㎛ Ra : 5u in
Filter	SUS316L DM EP Or EP OPTION 사항(Corrosive : Hastelloy C-22)	RMAX :〈0.7㎛ Ra : 5u in
Tube	SUS316L DM EP Or EP	RMAX :〈0.5㎛ Ra : 5u in
Transducer	SUS316L DM EP Or EP OPTION 사항(Corrosive : Hastelloy C-22)	RMAX :〈0.7㎛ Ra : 5u in
Fitting	SUS316L DM EP Or EP	RMAX :〈0.7㎛ Ra : 5u in

NEO CONFIDENTIAL

Business Area, facility system(Gas cabinet)

1-4) System control (option selection 1~3)

① *Manual Type : all system operation(open/close) be used by users*

② *Semi-Auto Type*	③ *Full-Auto Type*

• Purge Counter Setting and Gas purge automatically
• Manual Open / Close by push Button operation
• Auto System shut-down by EMG sensor.
• Monitoring the High and Low pressure
• Max/Min setting & Display interlock
: notice cylinder exchange Regulator By-Pass Error
• EMG Alarm - Main Cylinder Close(Valve Shutter)
• Auto change cylinder if two cylinder configuration.
	• Main control tower & monitoring, data management
	
	Main Menu
	- PROCESS progress
	  - Automatic Progress
	  - Manual Supply
	  - Pipe Cleaning
	  - Leak Test
	    - P : 1st Purge before exchange
	    - -L : Decompression LEAK CHECK
	    - P : 2nd Purge before exchange
	    - C: Cylinder Replacement
	    - P : 1st Purge before exchange
	    - +L : Pressure LEAK CHECK
	    - P : 2nd Purge After exchange
	- Assisant MENU
	  - Setting Mode
	  - Adjust Mode
	  - Option Setting
	  - Alarm List

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Business Area, facility system(Gas cabinet)

1-5) Option

Option - 1

- Fire sensor
- A device that detects and controls the initial flame in case of ignition or explosion due to gas leakage.

UV Sensor

UVIR Sensor

Option - 2

- Valve shutter
- In the event of gas leakage, the safety device is worked ; the main gas valve on the gas cylinder close, it is used to prevent major gas leak accidents.

Valve Shutter

High Temp Sensor

Option - 3

- Weight Scale
- It is applied for the purpose of checking the remaining gas amount, using weight

Option - 4

- Heating Cable
- To increase temp and vaporizing for the liquid gases to flow easily

Option - 5

- High Temperature Sensor (Pressure-resistant explosion-proof construction)
- Applied for the Flammable gas (Idle : -10~50℃ , Operation Temp : 90℃)

Business Area, facility system(Gas cabinet)

1-6) Quality for Gas cabinet manufacturing

Item	Tool	Assurance Spec
Moisture Measurement	NANO Trance Moisture Analyser	Less than 10 ppb/N2 (Option)
Oxygen Measurement	NANO Trance Oxygen Analyser	Less than 10 ppb/N2(Option)
Particle Measurement	Particle Analyser	More than 0.1μm ≤ 10EA /cf
Decompression Leak Check	PFEIFFER VACUUM He Detector	1 X 10^{-9} ATM, CC/sec
Pressure	1 and a haft time of maximum pressure for 24hours	High 1500 PSIG ±1% (Temp Compensation) Low 100 PSIG ±1% (Temp Compensation)

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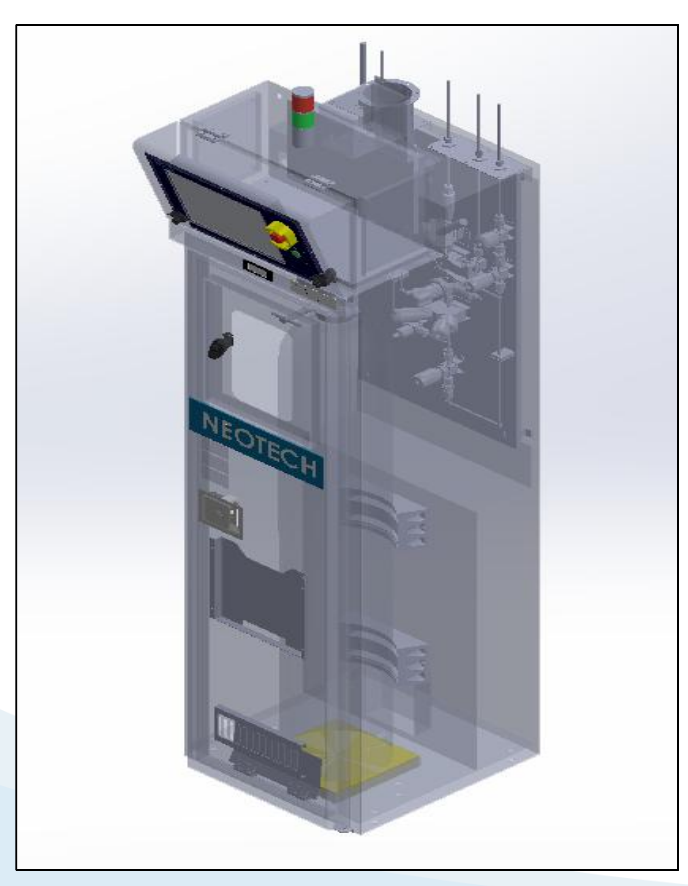
Business Area, facility system(Gas cabinet)

1-7) Specification for Gas cabinet



Components	Specification	
Enclosure	Dimension	W500 x D550 X H2000 (mm)
	Weight	200kg
	Body	SS400, T=2.6 or T=3.2
	Panel	STS304 (Polishing Plage), T=2
	Bottle Braket	AL 2024
	Safety Glass	Wire Depth 7T
	Paint	Epoxy Powder Paint [EX4504(S)-SR-WH020)
	Exaust Duct	4" Auto Damper(STS 304)
	Door Closer	Hydraulic, Opening to 100°C
Panel(Parts)	Regulator	TDR959 Series, RA 4micro inch
	Valve(High Pressure)	Diphram Valve, working pressure 3060psig Cv:0.1
	Valve(Low Pressure)	Diphram Valve, working pressure 150psig Cv:0.27
	Check Valve	Working Pressure 3000psig
	Line Filter	SS-A Series, 10^9
	Manual Valve	VCES Series,Working pressure Max 10bar
	Block Valve(High Pressure)	Max Pressure 20.6MPa Cv:0.07
	Block Valve(Low Pressure)	Working Pressure 1Mpa
	CGA connector	Jis Series
Controller	Dimension	500(w) x 260(d) x 330(h)
	Rated Voltage	AC100~120v, 200~240v (47~63hz)
	Current Consumption(Macimum)	AC220v,5A
	PLC	OMRON Cj2m-CPU14(CJ1M-Series)
	Touch Screen	10.4" TFTColor, Resolution 640x480
Safety Sensor	Gas Detector	Visible £ ±3%
	Valve Shutter	Working by Air(in the case of Emergency,Cylinder Valve is closed)
	Solid Aerosol Fire Extinguisher	Stand-alone automatic fire extinguisher, Operating Temperature -40℃~-50℃

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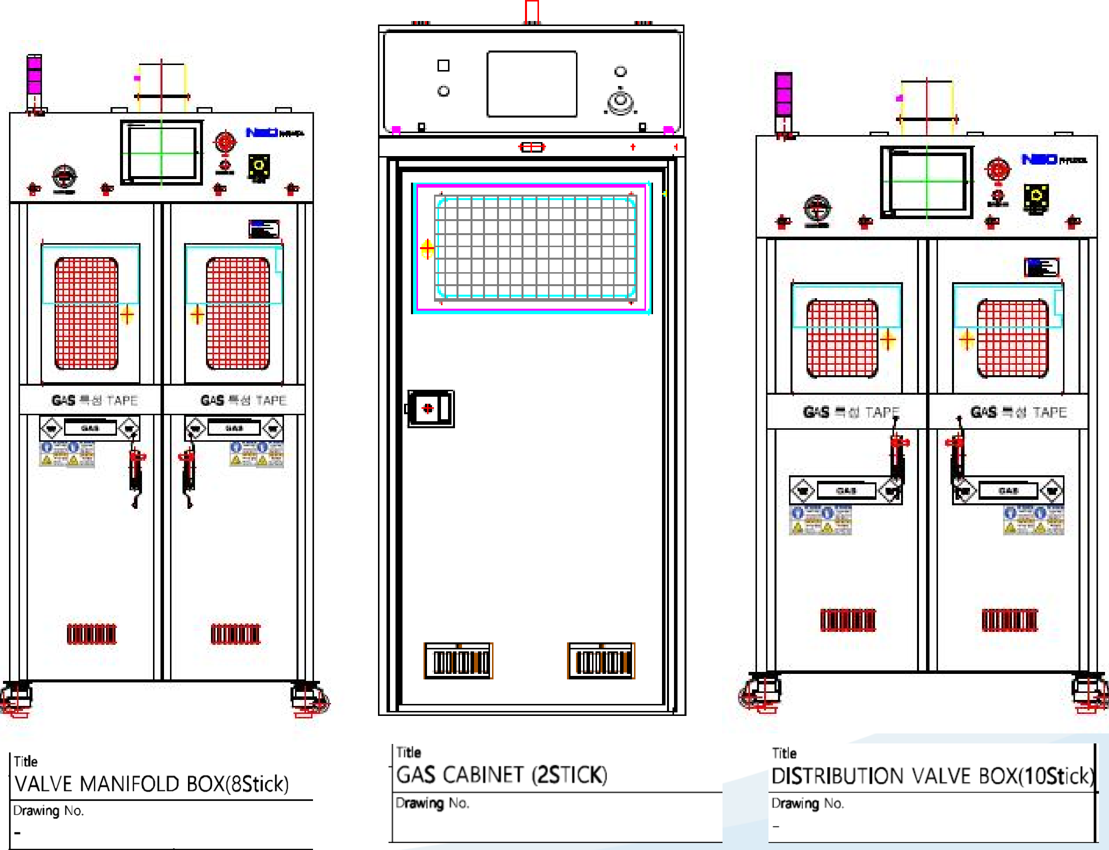
Company Profile, Sales record

Under business with Micron(SG) – Total 112systems (Oct ~ Dec. 2022)

VMB	
CH3F	1
COS	3
C4F6	7
HBr	7
NF3	26
SiH4	9
CL2	4
NH3	11
H2	15
CO	2
10%B2H6/H2	3
C3H6	3
HF	4
NO	6
CH2F2	2
5%B2H6/N2	3
DCS	2
20%F2/N2	7
HCl	2
SO2	1
BCl3	1
CH4	1
D2	1
C2H2	1
1%F2/Ar/Ne	1
1%F2/Kr/Ne	1
GARNET	1
5%PH3/N2	2
5%PH3/He	1
Total	128

Gas cabinet	
C4F6	1
HBr	1
CL2	1
SiCl4	3
1%F2/Ar/NE	1
1%F2/Kr/NE	1
NO	1
5%B2H6/N2	1
20%F2/N2	1
5%PH3/He	1
Total	12

DVB	
C4F6	1
HBr	1
NF3	2
SiH4	1
CL2	1
NH3	1
5%PH3/HE	1
5%B2H6/N2	1
NO	1
20%F2/N2	1
Total	11



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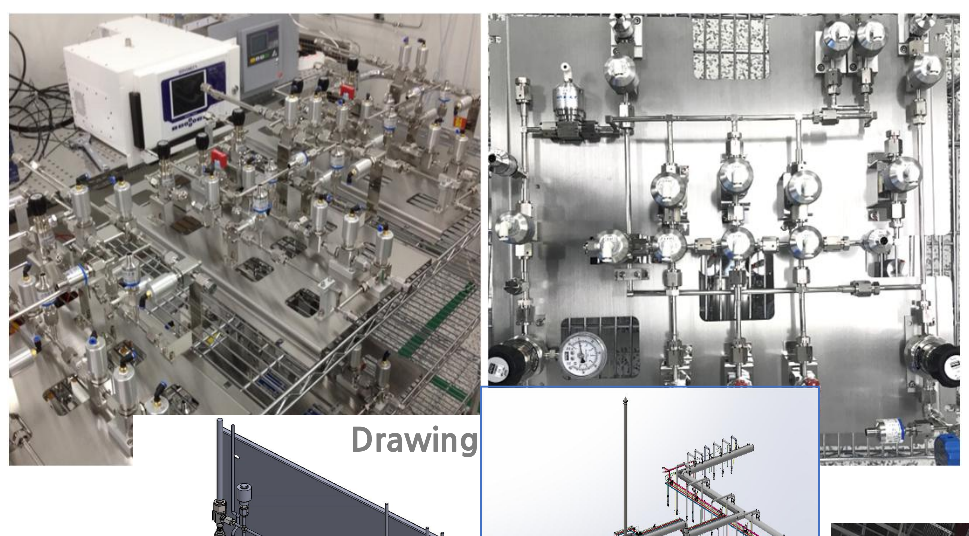
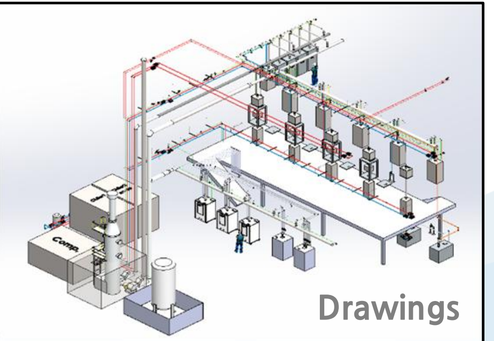
Business Area, facility system(VMB, Gas panel)

GCS system – VMB or DVB, Gas Rack & Panel



- The GCS System manufactured by us consists of a gas line and panel for storing special gas cylinders used in semiconductor, FPD, LED, and solar cell manufacturing processes and for safely supplying high-pressure charged gas.
- In addition, we manufacture devices (VMB, VMP) or main equipment that supply a certain amount of gas at a constant pressure, and these products are capable of auto safety interlock and pressured ventilation in case of emergency.



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Business Area, facility system(VMB, Gas panel)

| General / Safety Features |

- Customized and simple design
- Full auto system based on PLC
- Easy to use controller panel of LCD color touch screen
- Lowers the total cost of ownership by reducing the expenses of equipment, infrastructure, and consumables
- Gas distribution controller system available for gas supply
- Gas detector and auto shutter valve to prevent the spread of toxic
- All windows are reinforced wire glass
- Explosion proof design
- Emergency turn-off system
- Valve interlock system

| Specification / Option |

• Dimension	W1000 X D550 X H2000 (1X4, 1X6, 1X8 Stick)
• Case Material	SS400 t2.6 or 3.2
• Part Material	UHP Component
• Panel Material	STS304 t2 Polishing Plate
• Wire Reinforced Safety Glass	Wire Depth t7
• Controller Type	PLC, Color Touch Screen
• Electrical Spec.	220V Single Phase 5A (Basic) 220V Single Phase 25A (Heater)
• System Type	Full Auto, Semi Auto, Manual
• Communication	RS-232C, CLK, Ethernet

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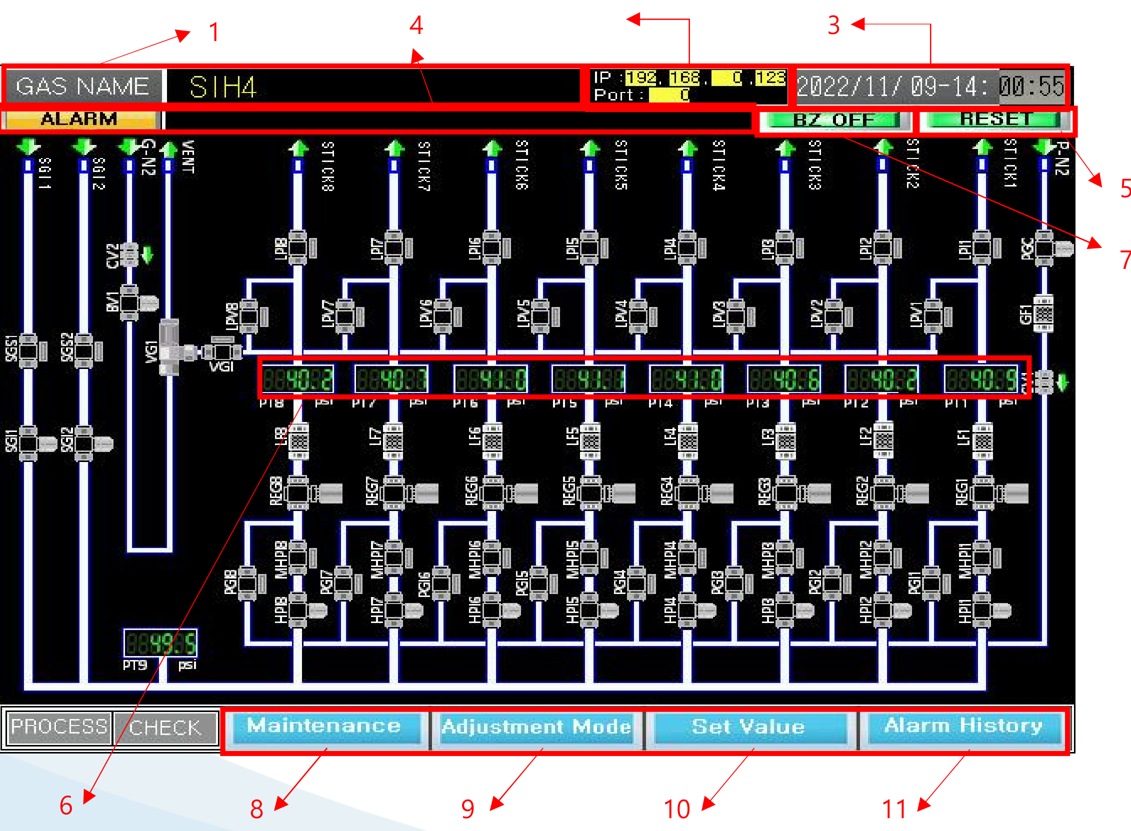
Business Area, facility system(VMB, Gas panel)

| Screen overview |



NO	Description	Function
1	Gas name	Gas name display
2	IP address	Show IP address
3	Date and time	Current time display
4	Alarm	Current alarm display
5	Alarm reset	To reset current alarm
6	PT value	Current pressure display
7	BZ OFF	Alarm Buzzer OFF
8	Maintenance	Switch to Maintenance page (to select Process mode, Check mode and Qc Mode)
9	Adjustment Mode	Switch to Adjustment mode page (to input PT range value and Off set value) (to proceed Auto Calibration)
10	Set Value	Switch to Set mode page (to select VMB Type (1*8sticks, 2*8sticks and DVB) (to set Network, Option, Password Change)
11	Alarm History	Alarm History display (available to delete history)

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Business Area, facility system(Gas cabinet and VMB)

❖ Sales record

System	Cabinet Concept	Gas	Quantity	Customer
Gas cabinet	2B*1 or 2P 1B*1 or 2P 3B*3P B:Cylinder P:Process	BCl3 C4F6 Cl2 HF WF6 NH3 SiH4 O2 CH2F2 COS	386	Direct sales: MICRON_Singapore Key Foundry HanWha Q-CELL ShinSung ENG MC MIRAE-BO ON-SEMI DBHITEK OEM Manufacturer: End-user -> SEC, Skhynix
VMB	1*10 1*8 1*6	BCl3 C4F6 CH2F2 CH4 Cl2 NF3 B2H6 SiH4 ClF3	111	

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Business Area, facility system(fire extinguisher)

GCS system – Embedded Fire extinguisher

Control Box

T50

Temp. Sensor

UV-IR

Cabinet
(Ex: Precursor Delivery System)

Novec1230(Liquid)

Solid Aerosol

Video

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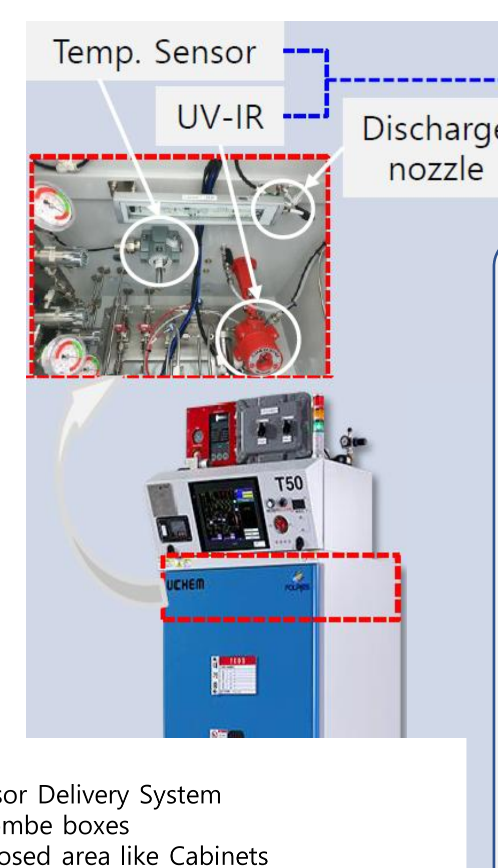
Business Area, facility system(fire extinguisher)

NEO



Signal cable

Discharge piping

5 ~ 10M long distance

Cabinet
. Precursor Delivery System
. Gas bombe boxes
. etc.. Closed area like Cabinets

High Value Problems

- Long distance and Required special area (non-explosion)
  - Needs special area for Fire extinguisher installation
  - Needs special piping and cable installation
  - Leak source between Cabinet and Fire extinguisher
- Ineffectiveness by standard fire extinguisher at blackout
  - No working if the fire extinguisher power be down
- Limited capacitance (ig. CO_2 chemical – 900g/1m^3)
- Environment & Safety
  - Suffocation risk by CO_2(closed area) & leak(piping)

1

Fire Extinguisher

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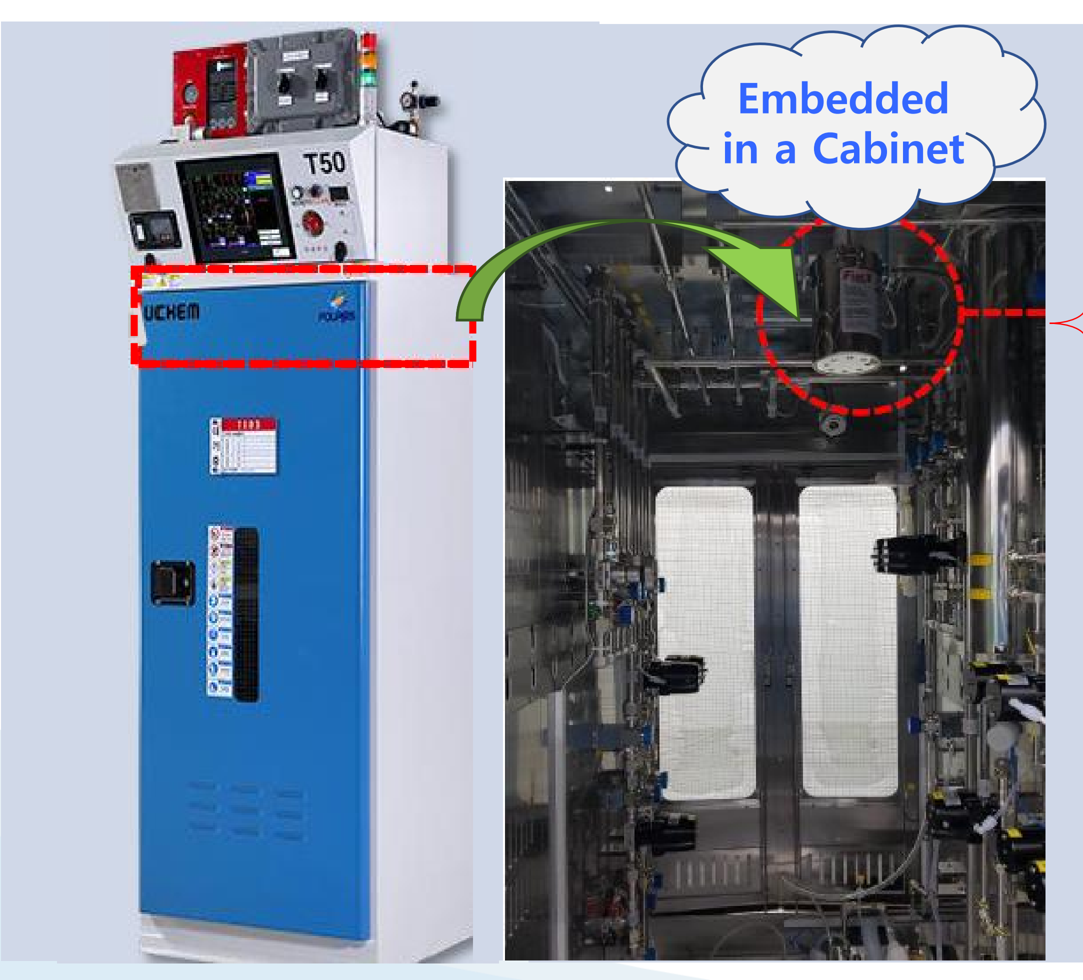
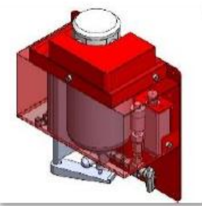
Business Area, facility system(fire extinguisher)



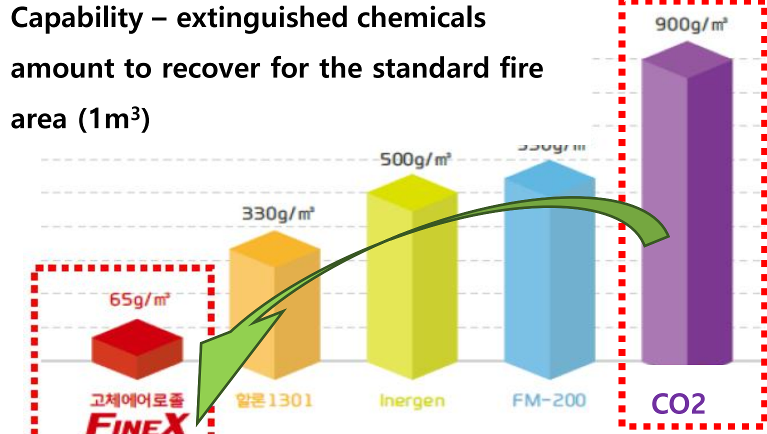
Solution for the effective fire extinguisher

1) Non-explosion proof area → Cabinet inside installation
2) CO2 chemical fire extinguisher → Aerosol or Novec1230



Case"1"
Novec1230(Liquid)

Capability – extinguished chemicals amount to recover for the standard fire area (1m³)



[F-Extinguisher chemicals for Clean-Fab]

Case"2"
Aerosol(solid)

Chemicals	Fine X	1301	FM200	CO2
ODP (Ozone Depletion Potential)	0	12	0	0
GWP (Global Warming Potential)	0	56,000	~3,000	1
ALT (Atmospheric Life Time)	0	54	~30	1
Electrical Conductivity	Ex_Low	Low	Low	Low
Corrosivity	Low	High	Mid	Mid
Extinguished Capability (g/m³)	65	330	530	900

Business Area, facility system(fire extinguisher)

@ Precursor & Gases Cabinet

Precursor 공급장치 발주 표준

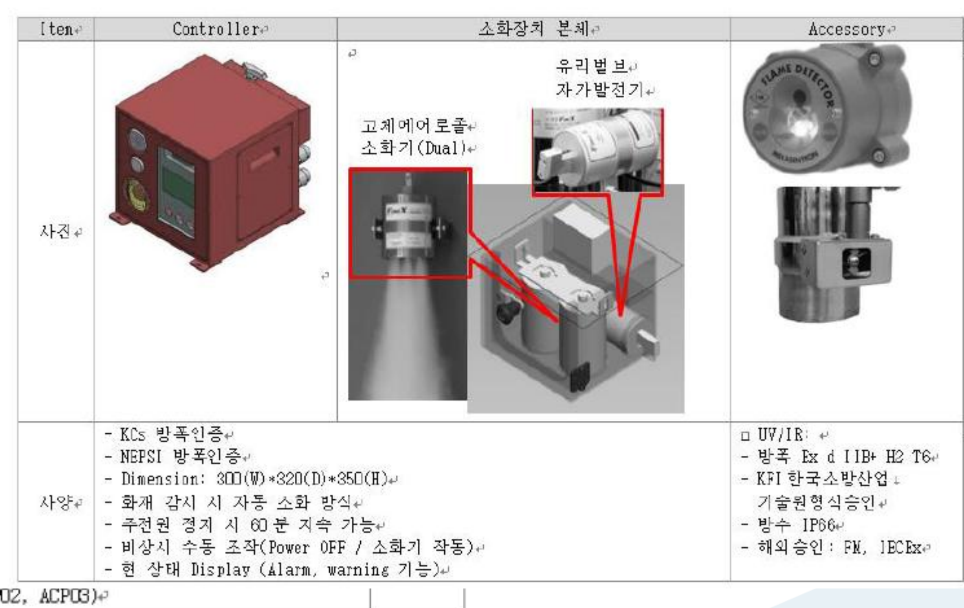
➢ **Standard process by major end-user in Kor.**

Defaulted specification in PO to Precursor and Gas cabinet suppliers.

KH_01071516 | …치 발주 …upply Eq

□ 제/개정 이력

구분	일자	작성자	제/개정 사유 및 …	
제정	17.11	송영우	Precursor 발주 표준 신규 제정	
개정	2018.06	송영우	1. 개조 공급장치 보증기간 없어 신규 공급장치 외 개조 … 2. Impurity에 대한 품질 스펙이 없어, Impurity spec 지… 3. 제조사마다 기준이 다른 QC실명제 Label 위치 통일화 … 4. 라인별 운영 간 이슈 발생 건에 대한 신규 프로그램 추… 5. Precursor 공급장치 구성품(parts, controller 등)에 … 6. 공급장치 인증 방법에 대한 명시가 없어 3자 인증, 방… 7. 신규물질 추가로 인한 적용 범위 대상 수정 필요(TURIN, GMP02, ACP03)	
개정	2018.11	송영우	1. Push gas(He, Ar) line의 Regulator 이중화 필요 2. 이중배관 대상을 S-gas와 마찬가지로 3류 자연발화성으로 변경 필요(HPK1, TEMAH, TMA) 3. DTLR 자동 소화기 개선 항목(내장형 소화기) 반영 필요 4. 공급장치 운영 편리성을 위해 원격 제어 Touch Screen 반영 필요 5. 현업 설비와 공급장치 간의 interface 통신 불가할 경우, 공급장치 구성 변경항목 추가 6. He line 역류 방지 목적으로 He inlet line에 Check Valve 설치 반영 필요	2



5.2.9. 내장형 소화기

1) 고체 에어로졸을 이용한 소화로 공급장치 내부에 소형 내장 설치 진행한다.
2) 방폭인증 제품으로 설치한다.

5.2.9.1. 구성품

Item	Controller	소화장치 본체	Accessory
사진		유리벨브 자가발전기 고체에어로졸 소화기(Dual)	
사양	- KCs 방폭인증 - NEPSI 방폭인증 - Dimension: 300(W)*320(D)*350(H) - 화재 감시 시 자동 소화 방식 - 주전원 정지 시 60분 지속 가능 - 비상시 수동 조작(Power OFF / 소화기 작동) - 현 상태 Display (Alarm, warning 기능)		□ UV/IR: - 방폭 Ex d IIB+ H2 T6 - KFI 한국소방산업 기술원형식승인 - 방수 IP66 - 해외승인 : FM, IECEx

NEO CONFIDENTIAL

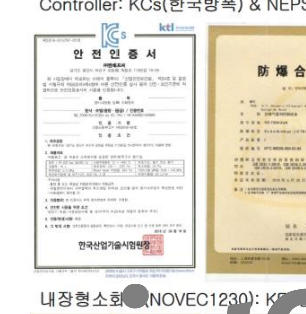
Business Area, facility system(fire extinguisher)

내장형소화기(고체에어로졸): KFI 인증서

특허 및 KFI 인증

UV-IR.: Kcs(한국방폭), NEPSI(중국방폭), KFI, ATEX, FM

Controller: KCs(한국방폭) & NEPSI(중국방폭), 전자파인증



내장형소화기(NOVEC1230): KFI 인증서

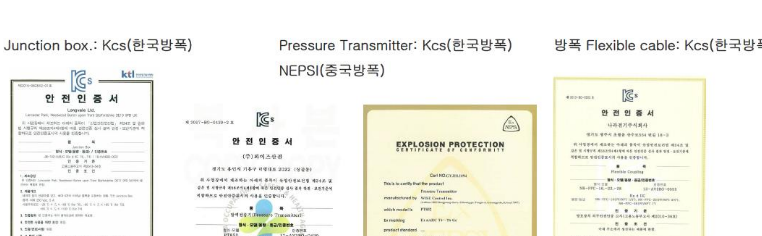
High Temp.: Kcs(한국방폭), NEPSI(중국방폭)

NEO exclusive IPs

Junction box.: Kcs(한국방폭)

Pressure Transmitter: Kcs(한국방폭) NEPSI(중국방폭)

방폭 Flexible cable: Kcs(한국방폭)



관인생략

출원번호통지서

출 원 일 자	2018.07.12
특 기 사 항	심사청구(무) 공개신청(무)
출 원 번 호	
출원인 명칭	
대리인 성명	특허법인가산
발명자 성명	고경삼
발명의 명칭	화재 관리 장치 및 방법

특 허 청 장

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Business Area, facility system(Scrubber)

Abatement system – Scrubber 01 Introduction _ Overview

1.1 Types of air pollutants

➢ **Enforcement Rules of the Air Conservation Act Air Pollutants**

- Particle matters, bromine and its compounds, aluminum and its compounds, vanadium and its compounds, manganese compounds, iron and its compounds,
- Zinc and its compounds, selenium and its compounds, antimony and its compounds, tin and its compounds, barium and its compounds, carbon monoxide,
- Nitrogen oxide, sulfur oxide, hydrogen sulfide, methyl sulfide, methyl disulfide, mercaptans, amines, carbon tetrachloride, carbon disulfide,
- Hydrocarbons, phosphorus and its compounds, boron compounds, aniline, benzene, styrene, cadmium and its compounds, cyanide, lead and its compounds;
- Bromine and its compounds, arsenic and its compounds, mercury and its compounds, copper and its compounds, chlorine and its compounds (5 ppm), fluorine compounds (2 ppm), asbestos,
- Nickel and its compounds, vinyl chloride, dioxin, phenol and its compounds, beryllium and its compounds, propylene oxide, polychlorinated biphenyls
- A total of 61 elements or compounds such as chloroform, formaldehyde, and acetaldehyde

➢ **Enforcement Rules of the Odor Prevention Act(Designated odor substances)**

- Ammonia, methyl mercaptan, hydrogen sulfide, dimethyl sulfide, dimethyl disulfide, trimethylamine, acetaldehyde, styrene, propion aldehyde, butyl aldehyde, n-valeraldehyde, i-valeraldehyde,
- Toluene, xylene, methyl ethyl ketone, methyl isobutyl ketone, butyl acetate,
- 22 types of designated odor substances including propionic acid, n-butyl acid, n-valeric acid, i-valeric acid, and i-butyl alcohol

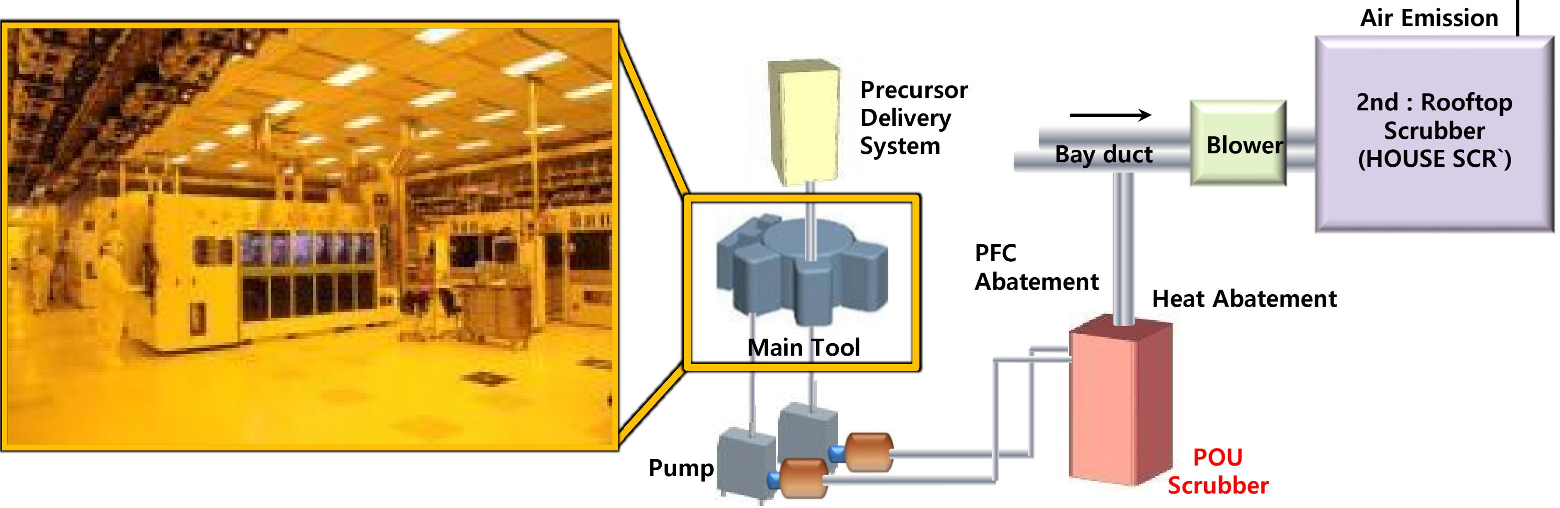
1.2 POU(Point Of Use) Scrubber

➢ **An abatement system that treats and discharges various types of harmful exhaust gases generated from main tools in the electronics industry, such as semiconductor process, display production process, and LED production process, below the appropriate standard value (TLV).**

Business Area, facility system(Scrubber)

Abatement system – Scrubber 01 Introduction _ Overview

1.3 Configuration diagram of POU Scrubber



- ✓ Abatement System : Pump Rear End 1st Scrubber(POU) → Exhaust Duct → Abatement FAN → 2nd Scrubber (House , Rooftop)
- ✓ Exhaust Bay Duct : Separated to Acid, Alkali, PFC, normal Abatement, thermal abatement etc, Discharged after treatment at each secondary scrubber

Business Area, facility system(Scrubber)

Abatement system – Scrubber

01 Introduction _ Overview

1.4 Type of POU Scrubber used in semiconductor FAB

Division	Dry Scrubber	Wet Scrubber	Thermal Wet Scrubber	Burn Wet Scrubber	Plasma Wet Scrubber
Scrubbing (basic principle)	A dry method that removes harmful gases using a chemical reaction between a specific harmful gas and a chemical absorbent at room temperature without using water or other heat sources	Wet method that removes only water-soluble gas using water as a basis without using a heat source	A hot-wet method that uses an electric heater, an indirect heat source, to remove combustible gas and air through thermal oxidation at a temperature of 700℃.	A method of removing PFCs gas through thermal oxidation by maintaining a temperature range of 1000℃ using LNG and O2 (Air), which are direct heat sources.	A method of removing PFCs gas through thermal decomposition by generating a plasma arc using electricity to maintain an ultra-high temperature of 1000℃ or higher.
Scrubber concept	Various Chemical Absorbents				
Gas to be treated	AsH_3, PH_3, Cl_2, BCl_3, HF, HCl, F_2, NH_3, TMA TEMAZr,Hf …	Cl, HCl, HF, NH_3, F_2, …	SiH_4, PH_3, TEOS, H_2, DCS, …	NF_3, S_2F_6, SF_6, CF_4, C_3F_8, …	NF_3, S_2F_6, SF_6, CF_4, C_3F_8, …

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Business Area, facility system(Scrubber)

Abatement system – Scrubber

02 Dry based scrubber _ processing principle

Gas-Solid interface

Gas film

Solid bulk

Gas bulk

[Adsorption and adhere on surface]

Gas

Solid

▶ **Adsorption and adhere on surface**

- A phenomenon in which the target material diffuses onto the surface of the adsorbent or inside the pores and comes into contact with the inner surface and adheres(ex : Activated carbon)

Gas-Solid interface

[Absorption and passing surface]

Gas film

Solid bulk

Gas bulk

Gas

Solid

▶ **Absorption and passing surface- Chemical adsorption**

- A phenomenon in which the target material diffuses into the surface of the adsorbent or inside the pores and reacts with the absorbent through chemical reactions or ion exchange(ex: penetration)
- Catalytic oxidation with appropriate temperature

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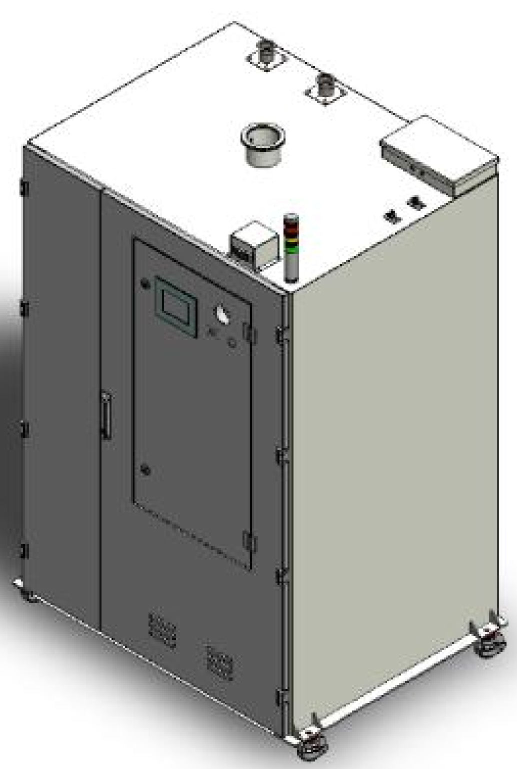
Business Area, facility system(Scrubber)

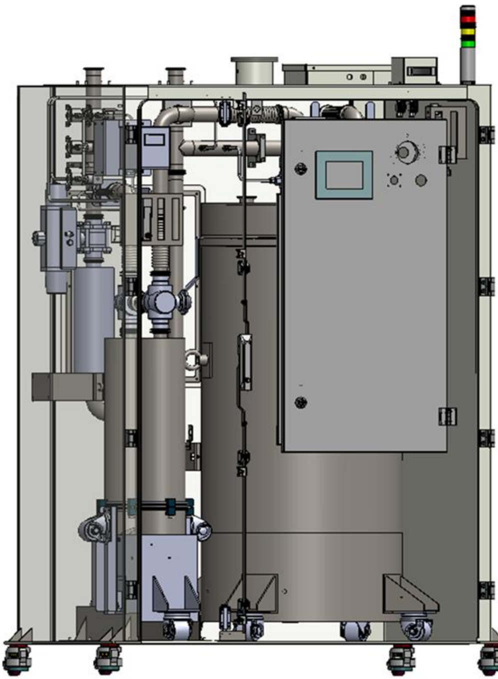
Abatement system – Scrubber

02 Dry based scrubber _ Overview



Waste gas abatement systems employ advanced chemisorption technology providing unmatched gas removal efficiency, and very simple to operate.

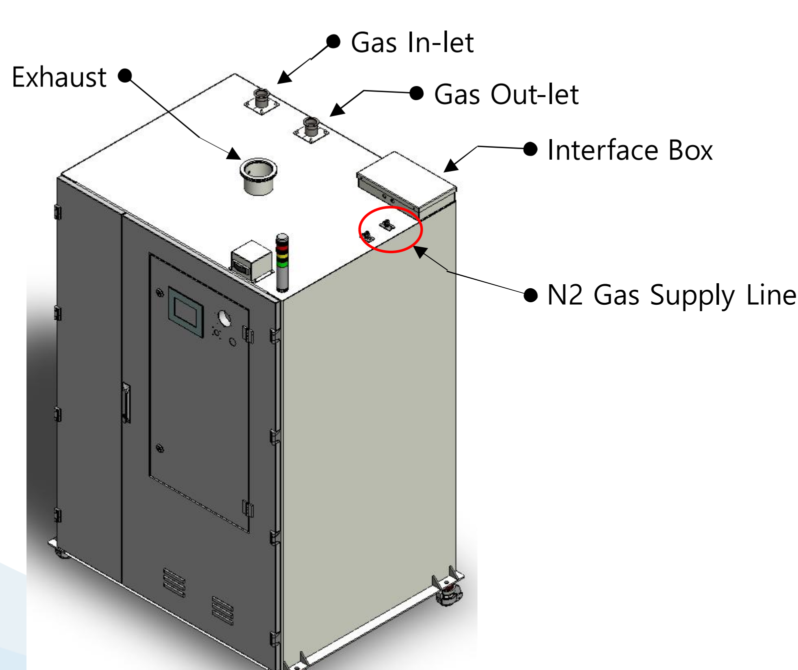
Dry absorber systems consume neither Electricity, water, nor fuel.



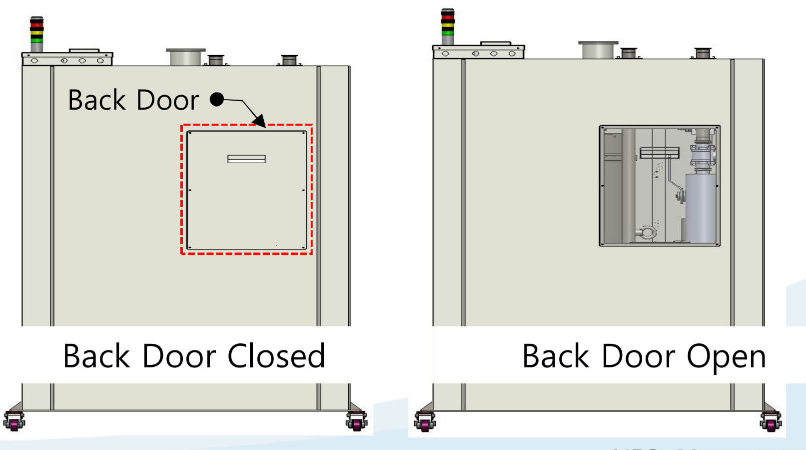
Business Area, facility system(Scrubber)

Abatement system – Scrubber

02 Dry based scrubber _ System view



No.	ITEM	Description
1	Gas In-let	Pump → SCR/ Process Gas In-let
2	Gas Out-let	SCR → Exhaust/ Emission Gas Out-let (Gas removal after chemisorption)
3	Interface Box	SCR Interface Signal Configure connection terminals
4	N2 Gas Supply Line	SCR Pneumatic supply Gas supply for Z-purge
5	Cabinet Exhaust	SCR Cabinet exhaust



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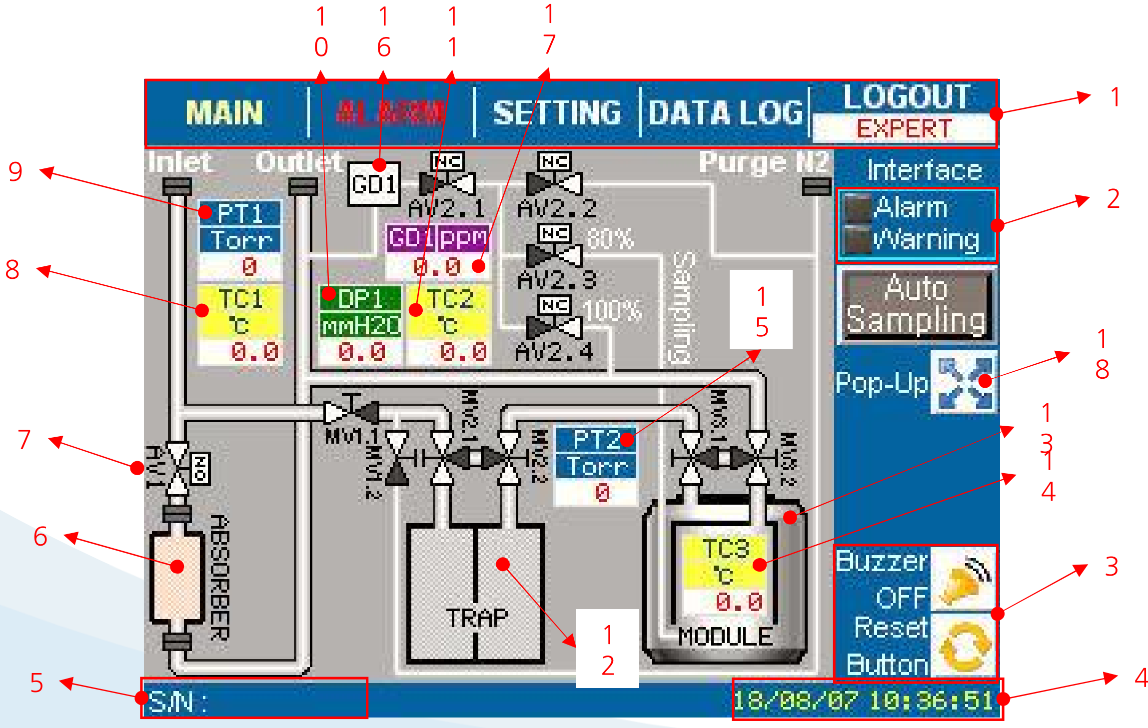
Business Area, facility system(Scrubber)

5 Abatement system – Scrubber 02 Dry based scrubber _ Touch screen



No.	NAME	DESCRIPTION
1	Menu bar	Operation function
2	Alarm / Warning	Rear time display warning & alarm (Led Lamp On)
3	Reset Button	Alarm reset & confirm
	Buzzer Stop	Sound stop
4	YY/MM/DD HH/MM/SS	System Alarm, Logging Data (Real time)
5	S/N	Serial Number
6	Absorber	By-pass cartridge

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Business Area, facility system(Scrubber)

5 Abatement system – Scrubber

02 Dry based scrubber _ P&I Drawing

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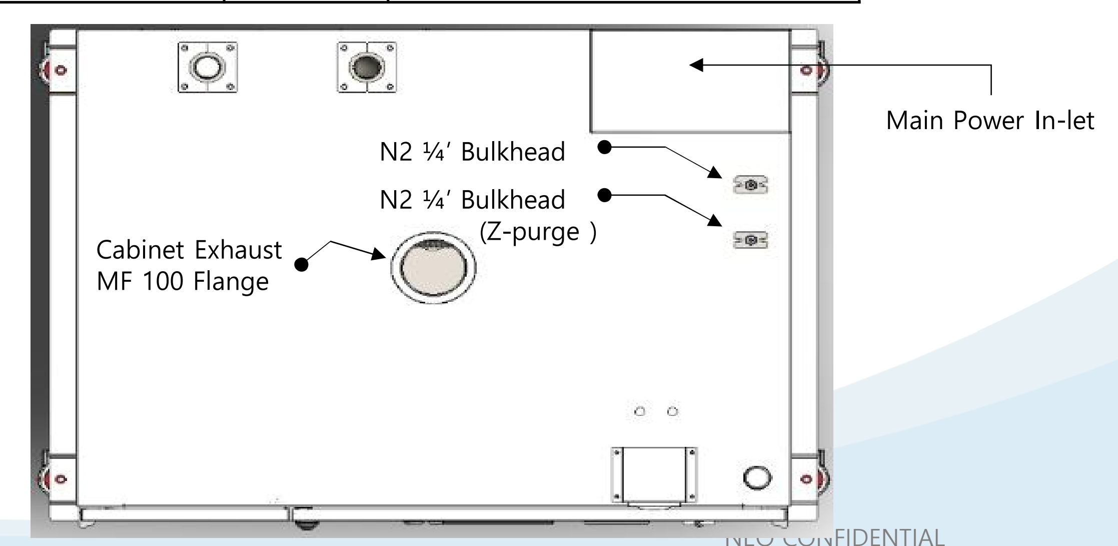
Business Area, facility system(Scrubber)

Abatement system – Scrubber

02 Dry based scrubber _ UT Connection

Utility	Connection	Purity Grade	Pressure	REMARK
N2 (Pneumatic supply & Purge)	1/4" Bulkhead Union	standard N2 (SN2,GN2,PN2)	0.5 ~0.7MPa	<3 SLM Used operate Pneumatic Valve
N2 or CDA (Dust Trap purge)	1/4" Bulkhead Union	standard N2 (CDA recommend)	0.5 ~0.7MPa	<3 SLM
Cabinet Exhaust Line	MF100 Flange	-	-	standard : ≥ 20Pa

Utility	Connection	Voltage	Phase
Electric Power	C/B: 10A 1.2KW	208-220 [V], 50/60 [Hz]	1(single)



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Business Area, facility system(Scrubber)

Abatement system – Scrubber

02 Dry based scrubber _ Application

➢ **Plasma etch**

Metal etch	Cl_2, BCl_3, HCl, CF_4, SF_6
Poly Silicon Etch	Cl_2, HBr, Br_2, SF_6, CF_4, BF_3, C_4F_8
Nitride etch, Oxide Etch	CF_4, CHF_3, C_2F_6, C_3F_8, C_4F_8, CH_2F_2, NF_3, O_2

➢ **Ion implantation**

High, Medium, Low	AsH_3, PH_3, BF_3, P, As, Sb, $Sb(CH_3)_3$, GeH_4, GeF_4

➢ **ALD, LPCVD PECVD, HDP-CVD**

High-K dielectrics	TMA, TEMAZr, TEMAHf, TDEAHf, TAETO, PET
Low-K dielectrics	1MS, 2MS, 3MS, 4MS, DMDMOS
Gate Electrodes	MPA, $Ru(Etcp)_2$, PEMAT
Silicon Germanium	SiH_4, GeH_4
Tungsten silicate	WF_6, SiH_4, H_2, DCS
Barrier Layers	$TiCl_4$, NH_3, TDMAT, PDMATa, PDEATa, TAETO, $W(CO)_6$
Poly Si (doped)	SiH_4, AsH_3, PH_3
Nitride (doped)	SiH_4, NH_3, (TMP, TMB, SiH_4, PH_3, B_2H_6)
Oxide	SiH_4, O_2

※ Not applicable when the vacuum pump flow rate exceeds 250 slm in some production processes.

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Business Area, facility system(Scrubber)

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5 Abatement system – Scrubber 03 Heat & Wet Scrubber

■ Outside view

OUTSIDE VIEW

1. SIZE : W x D x H : 700 x 750 x 1650

2. TYPE : Heat-Wet

3. CAPA. : 500LPM

4. Processing Gas : SiH_4,NH_3 etc,.

5. processing efficiency(DRE) : More than 95%

6. TANK TYPE : 2-stage separation (Partition installed inside of the tank)

SYSTEM CONFIG.

- PUMP DRAIN
- OVERFLOW DRAIN
- Water Tank
- Pressurized Spray
  Spray nozzle
- Circulation pump cooling
- Etc

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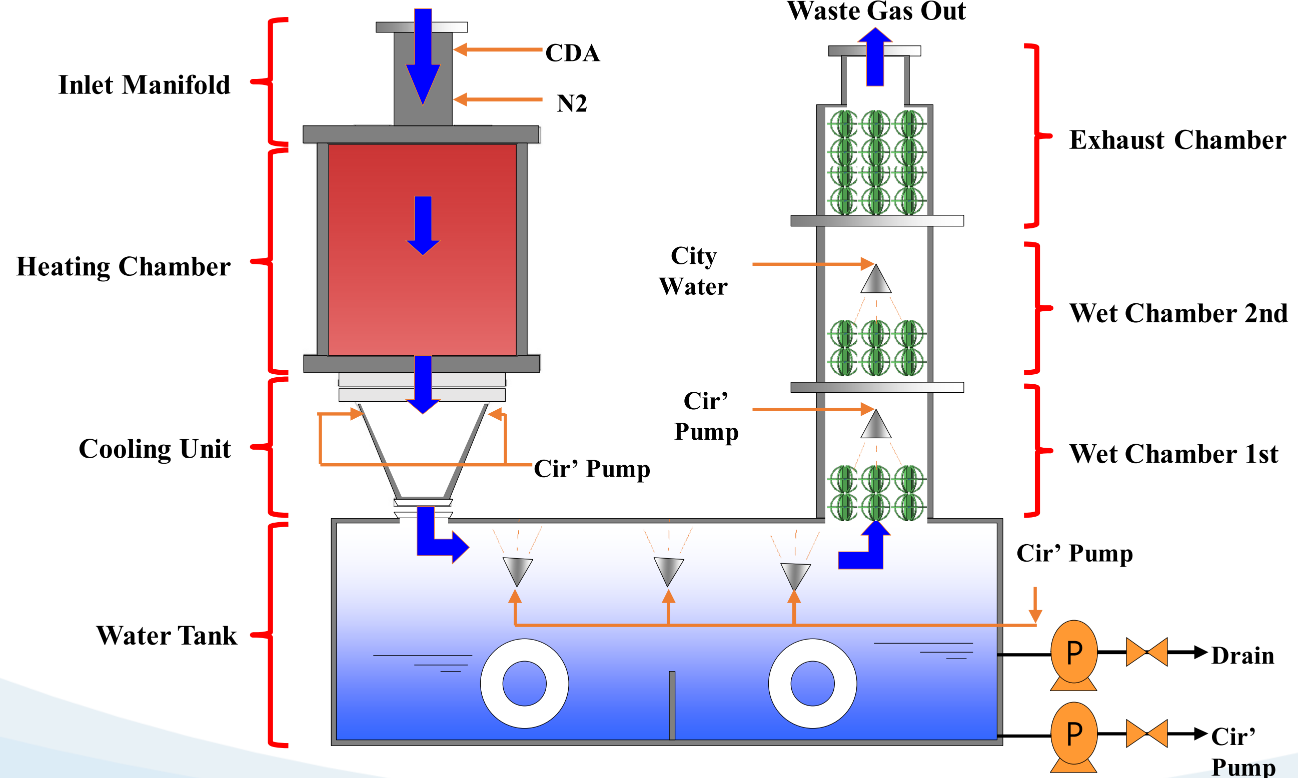
Business Area, facility system(Scrubber)

5 Abatement system – Scrubber 03 Heat & Wet Scrubber

■ Flow Diagram



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Business Area, facility system(Scrubber)

Abatement system – Scrubber

03 Heat & Wet Scrubber

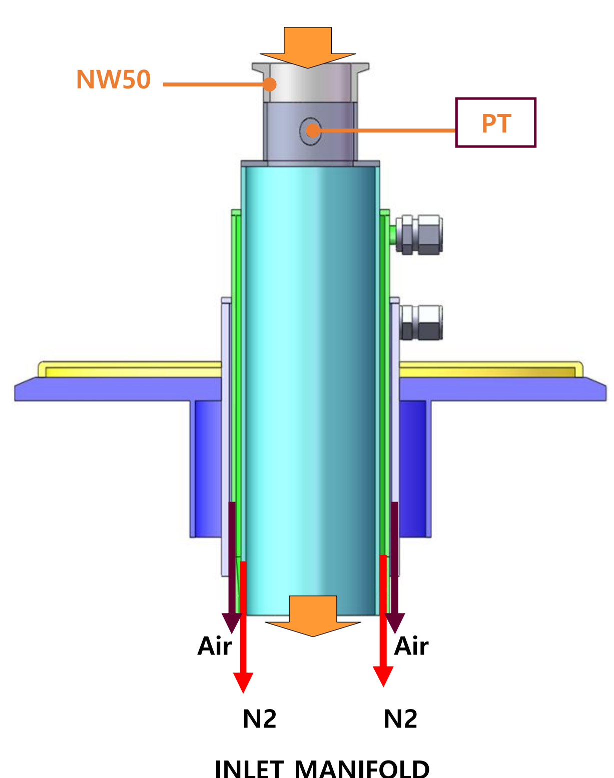
■ Modul Specification

#1 INLET MANIFOLD

① Leading Waste Gas to Heating Zone → Applying Venturi Effects

② Powder anti-stacking → Inlet Port size up (NW50)

③ Thermal Stress Prevention → Upper Part : PCW Cooling System Applicaiton (PCW → CW Available)



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Business Area, facility system(Scrubber)

5 Abatement system – Scrubber

03 Heat & Wet Scrubber

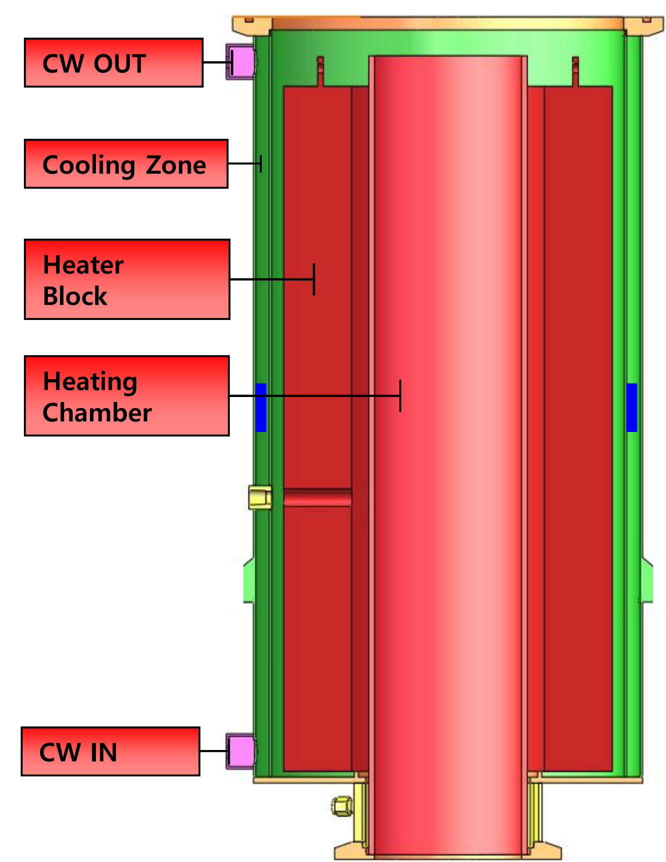
#2 Heating Chamber

① Treatment of waste gas flowing into the heating zone using oxidation reaction

② External cooling for safety (PCW Circulation)

③ For convenient maintenance, Chamber can be separated.

④ Minimizing the amount of heat emitted to the outside with excellent thermal insulation effect (insulator : Glass fiber 60T)



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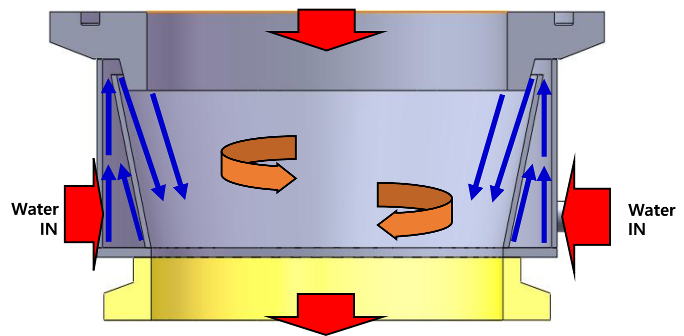
Business Area, facility system(Scrubber)

Abatement system – Scrubber

03 Heat & Wet Scrubber

■ Modul Specification



WASTE GAS OUT
WASTE GAS IN
Water
Nozzle
View Port

#3 Cooling unit

① The gas treated at high temperature (700 ℃) is introduced into the wet tank together with the powder.

② Maximizing the cooling effect by forming a water film in the unit (under 150 ℃)

③ Cyclone-forming structure eliminates the stacking of powder in the cooling unit

#4 Wet tank

① As a dual treatment device of natural discharge + forced pumping drain method, waste water in the tank is safely discharged

② Excellent wet treatment function by cooling and scrubbing function by internal spray nozzle

③ Strong against corrosion by applying internal Teflon Coating

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Business Area, facility system(Scrubber)

5 Abatement system – Scrubber

03 Heat & Wet Scrubber

■ Modul Specification

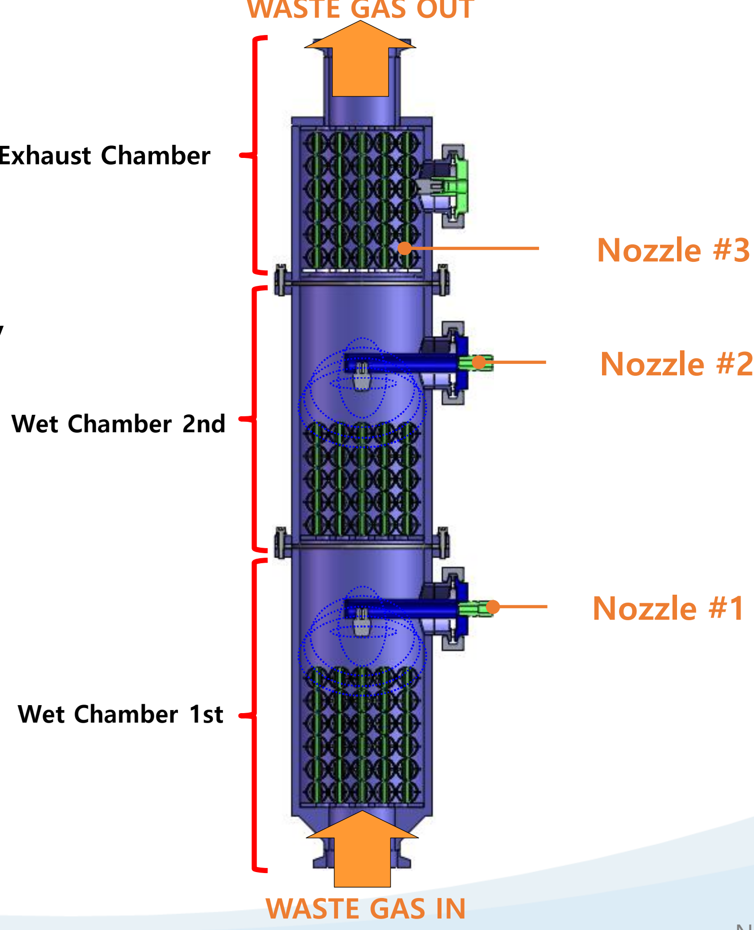
#5 Wet Chamber & Exhaust Chamber

① Pressurized Spray System -> Increase water-soluble gas treatment efficiency

② Packing structure prevents channeling and increases gas contact area

③ Packing structure prevents moisture scattering and collects fine powder

④ Outlet temperature below 25 °C



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Business Area, facility system(Scrubber)

Abatement system – Scrubber

03 Heat & Wet Scrubber

■ Utility Usage

Division		Pressure [kgf/cm²G]	Range of Use [LPM]	Range of Applied Area [LPM]	etc
Nitrogen (N2)		3 ~ 4	0-100	10	1 Port (Inlet)
CDA(Air)		3 ~ 4	0-100	40	1 Port (Inlet)
Water		1 ~ 3	4-10	4	1 Port (Inlet)
Power	Facility Capacity	10 KVA (1Phase, AC208V, 60Hz, 50A)			
	Average Power Consumption	3 KVA			
Heater	Specification	8Kw(Bulk Fiber)-Kanthal A1			
	Setting Temperature (℃)	600 ~ 800			

★ Utility usage range is applied based on efficiency data.

Business Area, facility system(Scrubber)

04 Plasma & Wet Scrubber

• 1.1 Backgrounds _ Why use Plasma

▣ Nationally Determined Contribution (NDC)

2020.12 Updated.

	absolute quantity method	BAU method
Goal of 2030	**24.4% reduction compared with 2017 emissions.**	37% reduction compared with 2030 emission forecast.
Parties	**EU, USA, Korea etc.**	Mexico, Turkey, etc.
Quality	**High confidence in the international community**	Low confidence in the international community

Nationally Determined Contribution (NDC) has significantly raised its previous reduction goal of GHG emissions from 26.3%(Y2018) to **40%(Y2021)**

▣ NDC Updated

2021.10 Updated. (Unit : Mton CO_2-eq)

Component		2018	Updated NDC
Total Emissions		727.6	**436.6 (-40.0%)**
Category	Power Plant	269.6	**149.9 (-44.4%)**
	Industry	260.5	**222.6 (-14.5%)**
	Building	52.1	**35.0 (-32.8%)**
	Transportation	98.1	**61.0 (-37.8%)**
	Agriculture Livestock Fishery	24.7	**18.0 (-27.1%)**
	Waste	17.1	**9.1 (-46.8%)**
	Hydrogen	-	**7.6**

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Business Area, facility system(Scrubber)

5 **Abatement system – Scrubber** 04 Plasma & Wet Scrubber

- 1.1 Backgrounds _ Why use Plasma

▣ SAMSUNG`s Roadmap

◆ Reduction of GHG emission

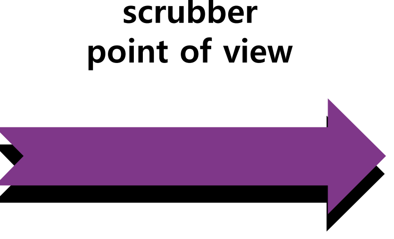
a. Reduction of PFCs gas

b. Increase DRE of Waste gases

c. Development of alternative Treatment for PFC gas

d. Reduction LNG(CH4) usage

scrubber point of view



DIFF	CVD	ETCH
Heat / wet	Heat / wet **Plasma / wet** **Depends on process**	**Plasma / wet**

- **SAMSUNG decided not use Burn/wet scrubber after P3 fab (Y2022)**
- **Starting use POU scrubber for ETCH process (Until now, ETCH process use Central roof scrubber)**
- **From Y2023, use only heat and plasma scrubber (P4 fab~)**

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Business Area, facility system(Scrubber)

Abatement system – Scrubber   04 Plasma & Wet Scrubber

- 1.2 Introduction

1.1 Principle

- Concept for processing PFC-based gas using thermal energy in a temperature range of several thousand degrees or more
- Arc discharge is generated by applying a high voltage potential difference to the terminals of the anode and cathode.
- Without the use of flammable gas of harmful components, the arc zone of tens of thousands of degrees is formed only by the high-pressure potential difference at the torque.
- A method in which PFCs gas passes through the arc zone (flame) to process the gas

1.2 Characteristic

- Smooth PM through maximization of PFCs gas processing efficiency and simplification of internal parts
- easy to understand the driving situation by using the touch screen and easy to change the setting value while driving
- Alarm history can be displayed by adding a memory function to the touch screen

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Business Area, facility system(Scrubber)

5 Abatement system – Scrubber 04 Plasma & Wet Scrubber

- 1.3 Internal Design

▣ Wet Tower

▣ Plasma Torch

▣ Cooling Unit

▣ Reactor Chamber

▣ Wet Tank

▣ BTM Chamber

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Business Area, facility system(Scrubber)

Abatement system – Scrubber **04 Plasma & Wet Scrubber**

- 1.3 Internal Design

No.	Components	Description
1	Plasma Torch	Electric discharge(Thermal DC ARC) is generated by electrodes inside the torch.
2	Reactor Chamber	Waste gases is supplied by inlet is removed with thermal DC ARC
3	BTM Chamber	Spray water to prevent recombination of decomposed gases
4	Cooling Unit	It is a device that rapidly cools heated gas and forms a water shield to prevent powder stacking and protect parts from corrosion gas.
5	Wet Tank	It stores water for cooling and water-soluble gas removal
6	Wet Tower	A reaction chamber for cooling and powder removal of waste gas and removing water-soluble gases

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Business Area, facility system(Scrubber)

Abatement system – Scrubber   04 Plasma & Wet Scrubber

- 1.4 Specification ➢ **It can be customized → Flexible design**

Components		Value
Dimension	Height	1,605 mm
	Width	1,000 mm
	Depth	800 mm
	Weight	400 kg
Power supply	Voltage	220 VAC
	Phase	3 Phase 50/60HZ, 25kW
	Breaker	100 A
Control Power	Voltage	220 VAC
	Phase	1 Phase 50/60HZ, 3.3kW
	Breaker	15 A

Components	Size	Type	Pressure
Gas Inlet	NW 50	Flange	-60 mmH2O
Gas Outlet	NW 50	Flange	-60 mmH2O
Cabinet Exhaust	NW 100	Flange	-30 mmH2O
CDA (option)	3/8 inch	Bulkhead union	4~6kgf/㎠ g
N2	3/8 inch	Bulkhead union	4~6kgf/㎠ g (40~60 slm)
CW	3/8 inch	Bulkhead union	4~6kgf/㎠ g (4~6 slm)
PCW In	3/8 inch	Bulkhead union	4~6kgf/㎠ g (6~8 slm)
PCW Out	3/8 inch	Bulkhead union	4~6kgf/㎠ g (6~8 slm)
Pump Drain	25 Φ	Union	-
Over flow Drain	30 Φ	Union	-

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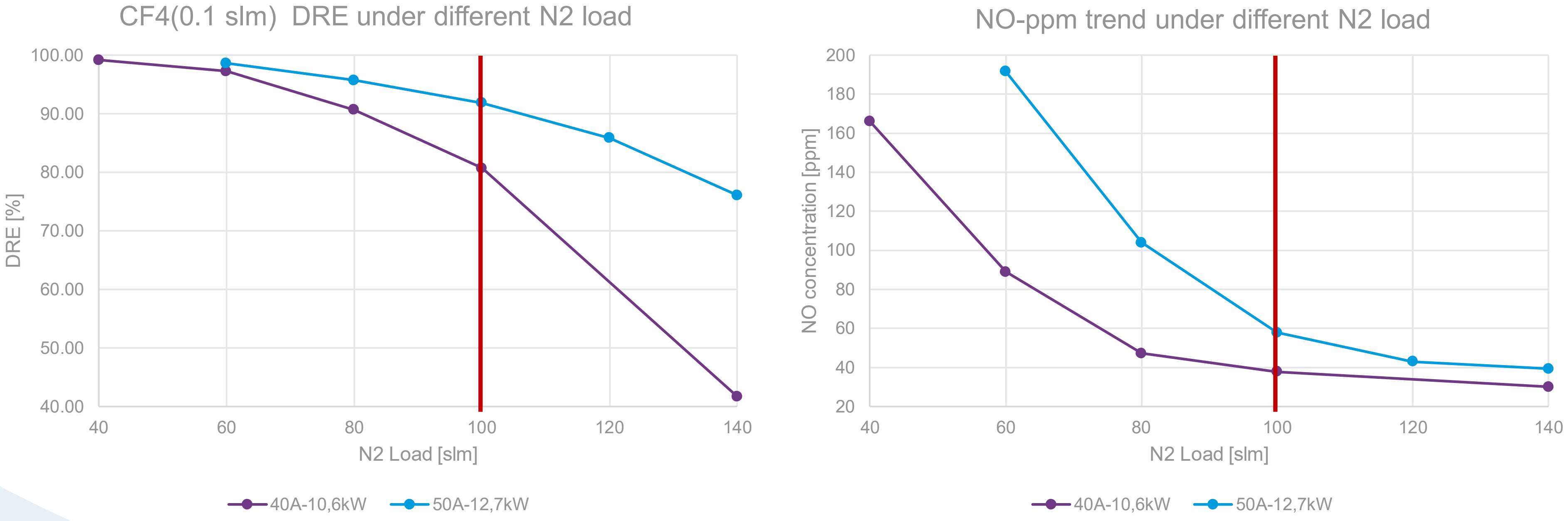
Business Area, facility system(Scrubber)

5 **Abatement system – Scrubber** **04 Plasma & Wet Scrubber**

▣ **DRE of CF4**



- ➢ **CF4 DRE 90% or more when using 12.7 kW under Load N2 100 slm (2 pumps) conditions**
- ➢ **NOx emissions : Under 60 ppm**

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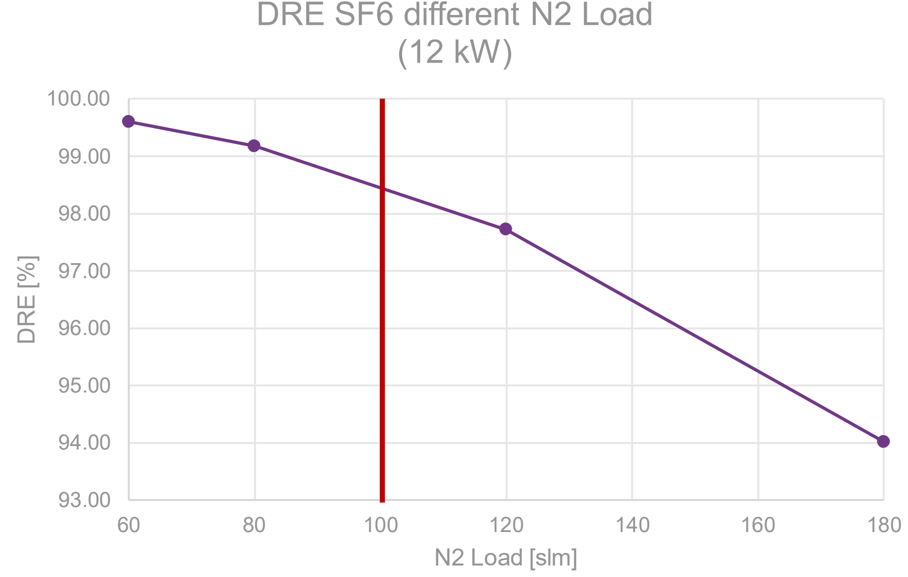
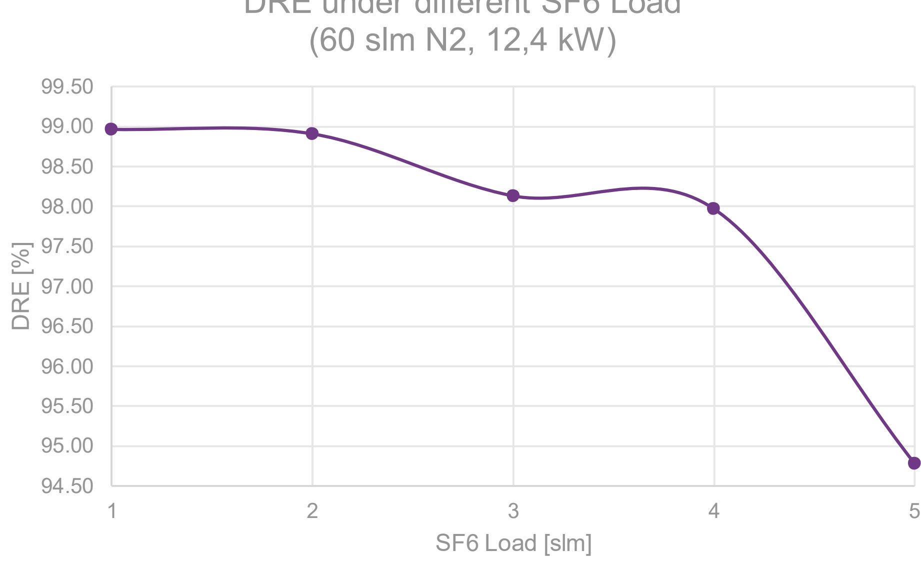
Business Area, facility system(Scrubber)

Abatement system – Scrubber   04 Plasma & Wet Scrubber

- 1.5 Performance   ▣ **DRE of SF6**





- ➢ **SF6 DRE 98% or more when using 12 kW under Load N2 100 slm (2 pumps) conditions**
- ➢ **When 12.4 kW is applied, approximately 95% DRE can be obtained even if SF6 5slm is introduced under Load N260 slm (1 pump) conditions.**

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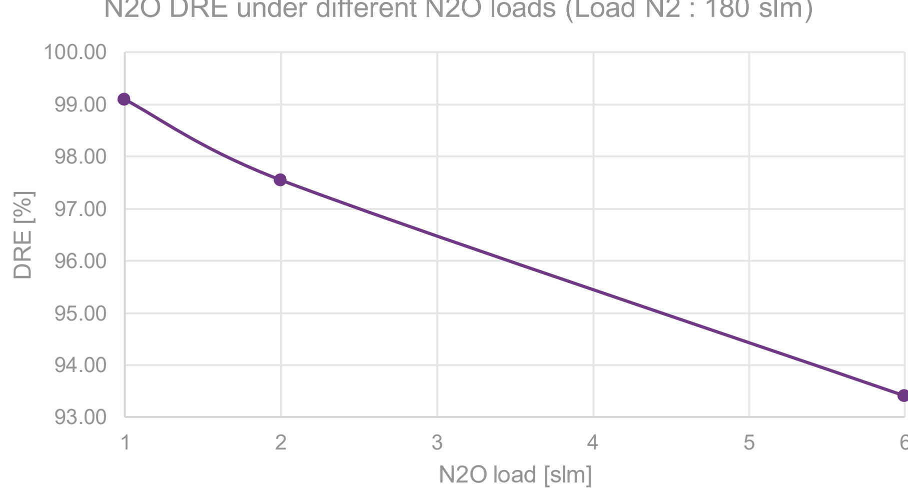
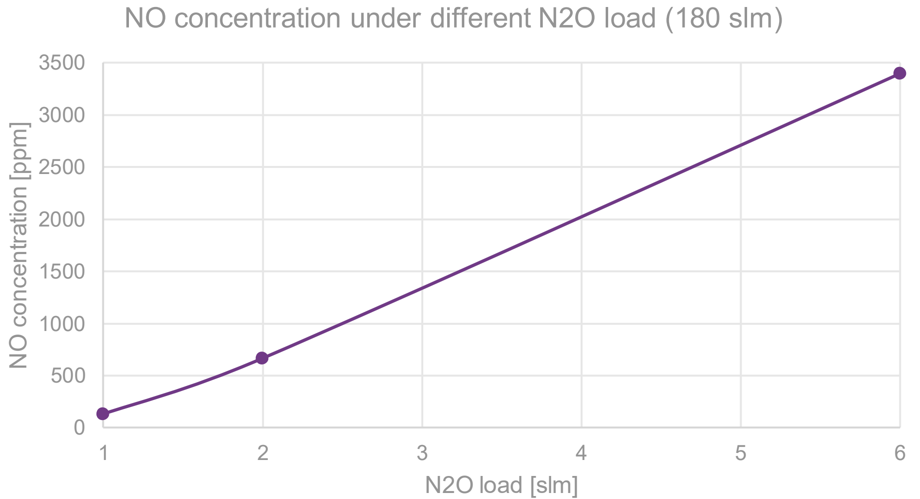
Business Area, facility system(Scrubber)

Abatement system – Scrubber   04 Plasma & Wet Scrubber

- 1.5 Performance   ▣ **DRE of N2O**





- ➢ **N2O DRE 90% or more when using 9 kW under Load N2 180 slm (3 pumps) conditions**
- ➢ **NOx emissions : Max 3500 ppm**

Business Area, facility system(Scrubber)

5 Abatement system – Scrubber 04 Plasma & Wet Scrubber

- 1.5 Performance

▣ Compare with competitors' performance

◆ Condition that satisfies 90% of CF4 DRE

Components	NFC	A″ Company	B″ Company	C″ Company
Power consumption	12.7 kW	13.1 kW	13.5 kW	13. 9 kW
Load N2	100 slm	100 slm	100 slm	100 slm

➢ **Superior performance to competitors**

➢ **As an option. E.P or dehumidifier can be applied for specific customer demands.**

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Business Area, facility system(Scrubber)

5 Abatement system – Scrubber 04 Plasma & Wet Scrubber

- 1.6 System Lay-out

POWER BOX
CDA
N2
CW
PCW IN
PCW OUT
DAMPER (MF100)
WASTE GAS OUTLET (NW80)
BY-PASS (NW50)
WASTE GAS INLET (NW50)
TOUCH
PANEL
POWER SUPPLY
PLASMA WET SCRUBBER
FLOWMETER
435
165
994
141
397
1503
1605
1000
102
800

NOTE.
Cleaning 작업 할 것.

1:16
A3
2019-04-03
PLASMA WET SCRUBBER
1/1
(주) 엔에프씨
P300-1B-000-00

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Business Area, facility system(Scrubber)

Abatement system – Scrubber　　04 Plasma & Wet Scrubber

- 1.7 Flow Diagram

5 Abatement system – Scrubber

04 Plasma & Wet Scrubber

- 1.7 Touch screen view

Moves to the MAINTENANCE screen when touched.

Select Menu when Touched screen appears.

FLOW DIAGRAM

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Business Area, facility system(Scrubber)

5 **Abatement system – Scrubber** **04 Plasma & Wet Scrubber**

- 1.8 Power supply

< Front>

Current Set Knob

Run/Stop S/W

Power S/W

Remote/Local S/W

#1. Front, Rear 2 Places BASE (Fixed)

< Rear >

#5. POWER SUPPLY SINGNAL CONNECTOR TO. PLC

#2. FROM. Control Part M/C POWER SUPPLY MAIN Power

#3. FROM. Control Part M/C POWER SUPPLY MAIN Power (TO. TORCH)

#4. PCW IN, OUTLET 3/8"

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Business Area, Clean room & UT hook-up

Clean room design & Construction

- Clean room

Class : 1,000 Zone

Air Handling Unit(1,644cmm)

sigetronics : Clean Room & Utility construction (1,200 m2)

Class 100~1,000 Zone

Business Area, Clean room & UT hook-up

Clean room design & Construction

- System celling & Access floor

System Ceiling Work's

Access Floor Work's

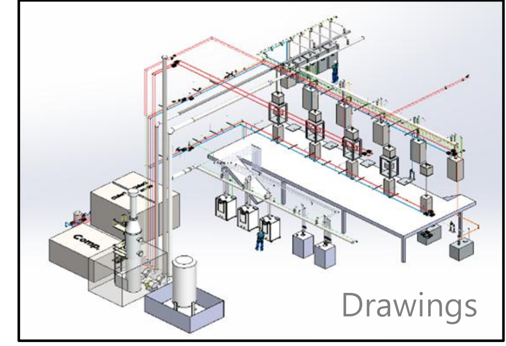
sekonix : System Ceiling & Access Floor construction(850 m2)

Class 100 Zone

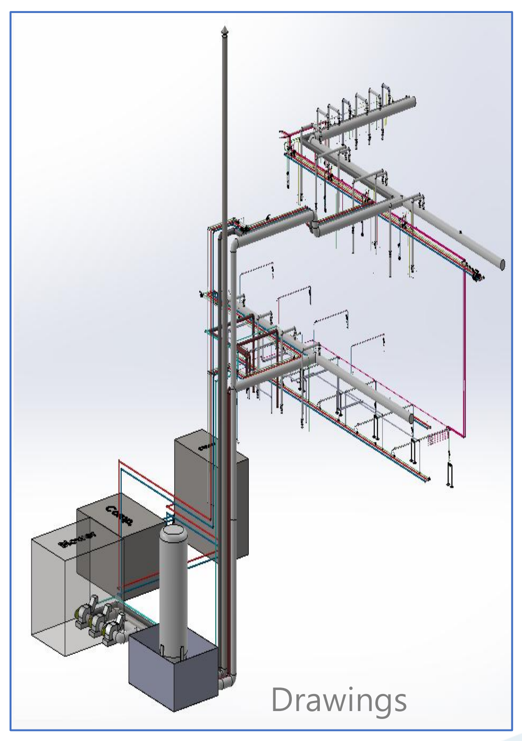
Business Area, Clean room & UT hook-up

Clean room design & Construction

- Utility hook-up



Drawings



Drawings

Manufacturing and constructing the toxic gas pipe, the liquid chemical gas pipe, the corrosive gas pipe, the flammable gas pipe, and the supply gas pipe

Business Area, Clean room & UT hook-up

Sales record

NO	construction company	major construction details	construction period	construction worker	order amount (100 mil.)
1	iones	1. Clean Room System construction 1-1. Class 100 Zone 1-2. Class 1,000 Zone 2. Utility Piping construction 2-1. Utility Piping construction	2018.01~2018.03	manager and 15 persons	11
2	sigetronics	1. Clean Room System construction 1-1. Class 100 Zone 1-2. Class 1,000 Zone 2. Utility Piping construction 2-1. Utility Piping construction 2-2. Exhaust System construction	2018.08~2018.12	manager and 20 persons	14.5
3	sekonix	1. System Ceiling construction 1-1. System Ceiling(Class 100) 1-2. Access Floor	2018.05~2018.06	manager and 10 persons	8.5
4	kolen	1. System Ceiling construction 1-1. System Ceiling(Class 100) 1-2. Access Floor	2019.09~2019.10	manager and 8 persons	6.3
5	jeiltech	1. Clean Room System construction 1-1. Class 100 Zone 1-2. Class 10,000 Zone	2019.12	manager and 3 persons	1

Business Area, Clean room & UT hook-up

Sales record

NO	construction company	major construction details	construction period	construction worker	order amount (100 mil.)
6	Samsung Electronics	1. 15L SCR UT Hook-up construction 1-1. MAIN U/T LINE 1-2. TOXIC GAS LINE 2. Pyeongtaek P1 SCR UT construction 2-1. Exhaust duct construction 2-2. 3rd pipe toxic construction	2018.02~2019.09	manager and 18 persons	80
7	SK Hynix	1. M14 Clean room Exhaust duct construction 1-1. MAIN U/T LINE 1-2. TOXIC GAS LINE 1-3. 3rd pipe N2 pipe construction	2018.01~2020.02	manager and 15 persons	21
8	Yonsei University NANO FAB	1. R&D 1st and 2nd pipe construction 1-1. MAIN U/T LINE 1-2. TOXIC GAS LINE 1-3. air discharge construction 1-4. GAS CABINET	2018.01 (4 months)	manager and 20 persons	18
9	TOP ENG	1. internal pipe and setup of MOCVD equipmen 1-1. inside panel design, manufacturing, and installation 1-2. hook-up pipe installation	2018. .01	manager and 12 persons	3.7

Business Area, Clean room & UT hook-up

Sales record

NO	construction company	major construction details	construction period	construction worker	order amount (100 mil.)
10	ADP	1. F2 gas double pipe construction	2018. .07	manager and 4 persons	1
11	Chonbuk National University NANO FAB	1. additional expansion pipe construction of the nano fab 1-1. MAIN U/T LINE 1-2. TOXIC GAS LINE 1-3. air discharge LINE	2018.01 (2 months)	manager and 13 persons	10
12	Iksan Photoelectron	1. the 2nd pipe construction of the fab expansion equipment, 1-1. U/T LINE 1-2. TOXIC GAS LINE 1-3. air discharge LINE	2018.07 (3 months)	manager and 18 persons	7
13	Jeungpyeong Shinsung Solar	1. 1st and 2nd pipe construction of the fab expansion equipment 1-1. U/T LINE 1-2. TOXIC GAS LINE 1-3. air discharge LINE	2018.12 (4 months)	manager and 20 persons	16

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Business Area, Clean room & UT hook-up

Sales record

NO	construction company	major construction details	construction period	construction worker	order amount (100 mil.)
14	Jincheon Hanwha Q CELLS	1. Chemical supply device pipe construction 1-1. internal pipe construction of the supply device explosion-proof room 1-2. double pipe construction for chemical 1-3. air discharge LINE 1-4 electricity and communication installation	2019.6 (2 months)	manager and 12 persons	5
15	new establishment of the Milaebo research institute	1. research institute, new establishment of the TiN process power trap 1-1. preparation of the overall design drawing 1-2. UT, electricity, doing air discharge construction 1-3. 3rd pipe construction for chemical	2020.04 (6 months)	manager and 10 persons	21
16	SVS(Seoul Biosys) UT	1. 2rd pipe work for MOCVD equipment 1-1. U/T LINE 1-2. TOXIC GAS LINE 1-3. air discharge LINE	2020.04 (3 months)	manager and 4 persons	4

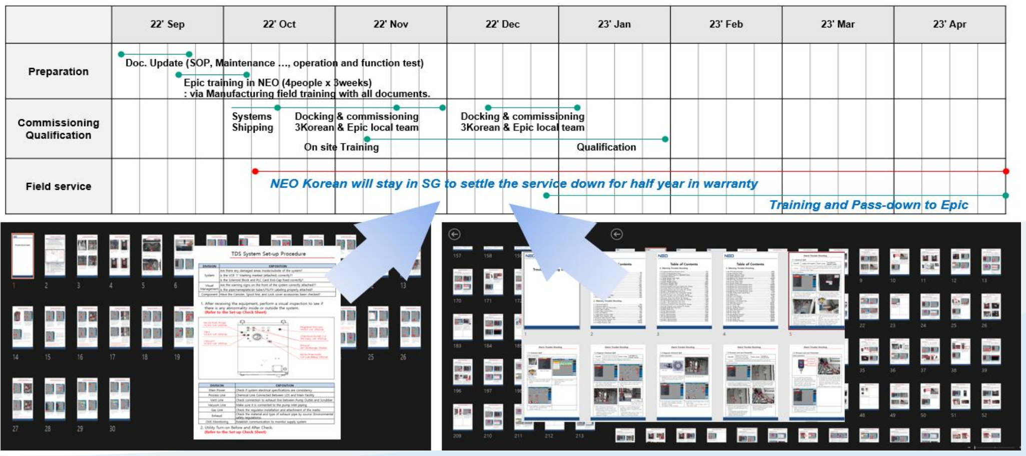
Etc., field service plan

Technical Support	Start-up Installation	On-site service	
		Normal case	Abnormal
NEOTECH (Korea)	**Local Engineer + NEO Support** Operating & Technical training **(during start-up)**	On-site service by Local Team - Patrol (2time/ 1day) - During the start-up - Warranty in	On-site: by local team On-call: 1st_ Local engineer 2nd_ by NEO Technical Support

- **Field support by NEO Local Team(Epic Technology) ,**

  : It needs to be service contract as normal case
- **SG. Local Agent : Epic Technology sales**
- Service support detail
  - Documentation
  - Technical support
  - Trouble shooting
  - Spare parts

Milestone for field service after sales



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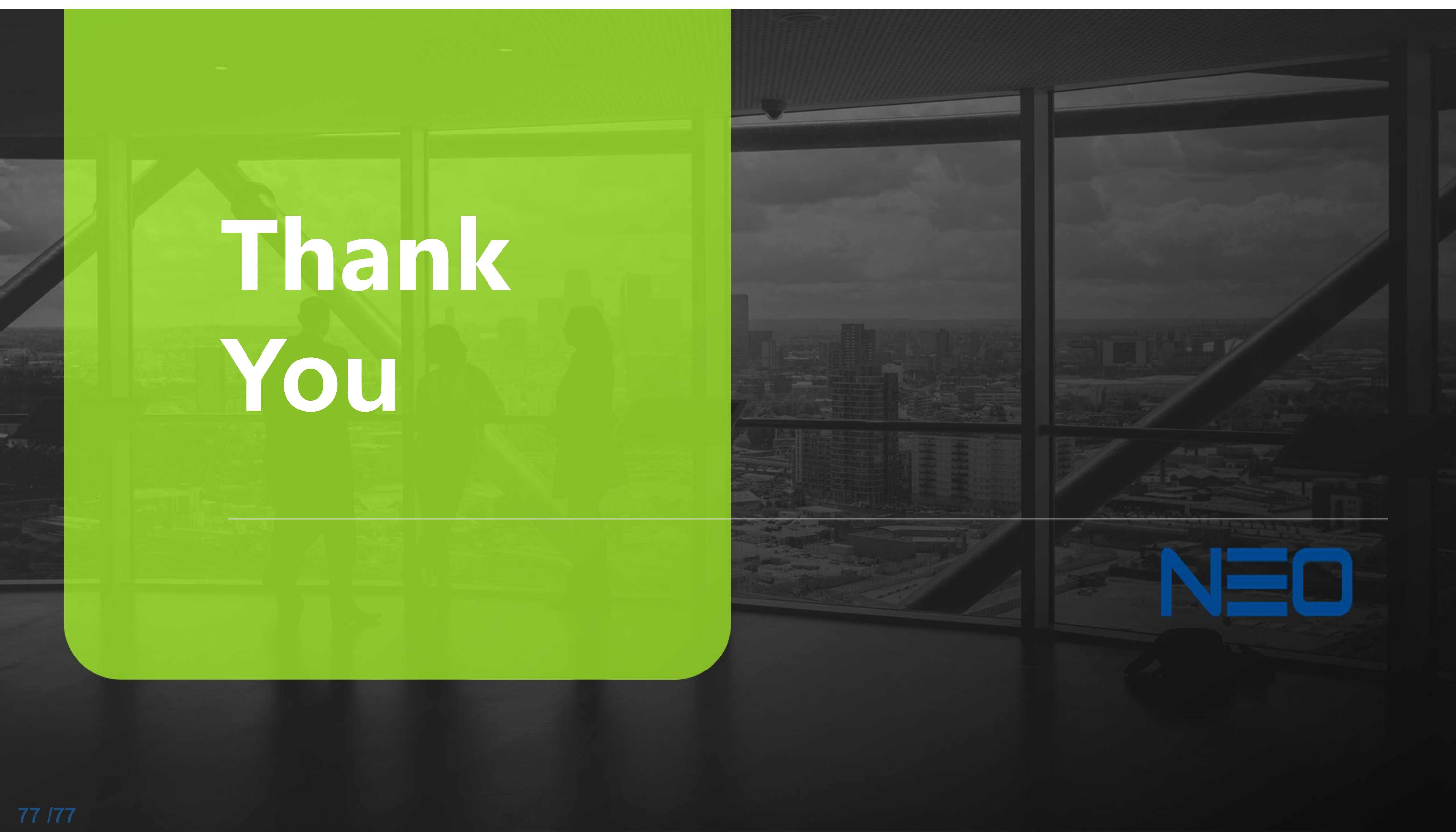
Thank You
NEO