

GALAXY TECHNOLOGY

SAWING – GRINDING – LAPPING – POLISHING

凱勒斯科技有限公司

Challenge Impossible!

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目錄

具有碳中和、環境污染防治技術 守護人類未來的企業

With carbon neutrality, environmental pollution prevention technology

A Company protecting the future of mankind

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水垢危害 Scale – Troublemaker

水垢

What is Scale?

水加熱後，一部分水蒸發，本來不好溶解的硫酸鈣沉澱下來。原來溶解的碳酸氫鈣和碳酸氫鎂，在沸騰的水裡分解，放出二氧化碳，變成難溶解的碳酸鈣和碳酸鎂也沉澱下來

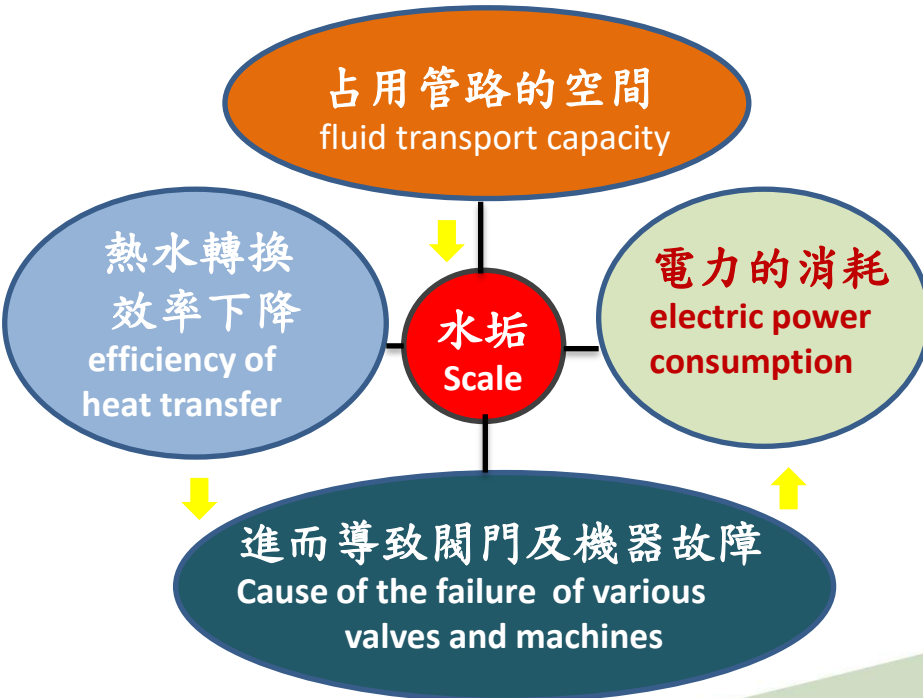
The deposited substance of mineral solids (Ca^{2+} , Mg^{2+} , etc.) on the interior surface of water tube or heat exchange unit



水垢圖

[Scale blockage in the pipe]

水垢會產生的問題 Problems by Scale



傳統移除水垢的傳統方式

① 化學處理 Chemical treatment

使用有害化學藥劑去除 –

Using harmful chemicals to remove Scale

不會完整地移除水垢 –

No perfect removal & prevention of Scale

還須花費化學藥劑的費用及水的消耗-

Needed chemicals and wastewater treatment costs

② 物理處理 Physical treatment

用刷子搭配高壓水清洗 –

Cleaning pipe by using a brush or high-pressure water

效果短暫要定時清洗 –

Effect is temporary and periodic work is necessary.

會造成 HVAC 的傷害 –

Damages on the HVAC equipment

✓ Scale inhibitor example



✓ Pipe cleaning example



HVAC系統中水垢厚度的效能變化

Energy efficiency changes by Scale thickness in the HVAC system

Carrier & Beatrix 的實驗數據 Experimental data by Carrier & Beatrix

熱交換器中有0.5mm厚度水垢
會使壓縮機產生18%額外的消耗

- In case of 0.5mm scale thickness
- of the heat exchanger
- Compressor power : ~18% additional use

熱交換器中有0.5mm厚度水垢
會使吸收式冰箱產生16%額外的消耗
渦輪式冰箱產生13%額外的消耗

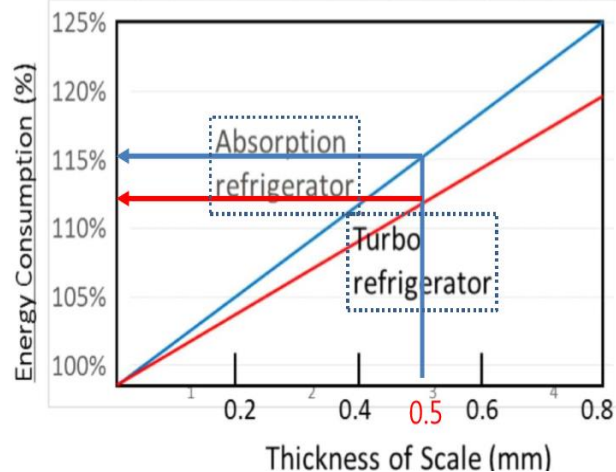
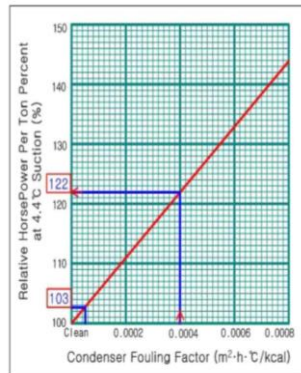
- * In case of 0.5mm scale thickness of the heat exchanger
- Absorption refrigerator power : ~16% additional use
- Turbo refrigerator power : ~13% additional use

✓ Increase rate of required power with pollution degree (scale thickness)

Power (%)	Fouling factor (m ² h ² /kcal)	Scale Thickness (mm)	Power (%)	Fouling factor (m ² h ² /kcal)	Scale Thickness (mm)
0.0	0.00000	0.000	22.0	0.00040	0.610
3.0	0.00005	0.076	24.2	0.00045	0.671
5.5	0.00010	0.152	27.5	0.00050	0.782
8.8	0.00015	0.244	29.7	0.00055	0.823
11.0	0.00020	0.305	33.0	0.00060	0.914
13.2	0.00025	0.366	35.2	0.00065	0.975
16.5	0.00030	0.457	39.6	0.00070	1.097
18.7	0.00035	0.518	42.9	0.00075	1.189

Source) Carrier : refrigerator handbook

✓ Variation of compressor required power with pollution of condenser tube



Source) Beatrix : scale removal & prevention equipment company

移除或防止水垢可以提高能源效率來降低能源成本

Removing or preventing scale can reduce energy costs by increasing energy efficiency



- Energy loss of vapor compression refrigerator by scale
- fouling factor of refrigerator manufacturer design criteria : 0.0001
- actual fouling factor of field operation facility : range of 0.0004 ~ 0.0006

eSPC 的必要性 The necessity of the eSPC

省水/節能/節省化學藥劑的完美解決方案，符合碳中和2050政策和ESG 管理

Perfect solution for water/energy/chemicals saving, carbon neutrality 2050, and ESG management

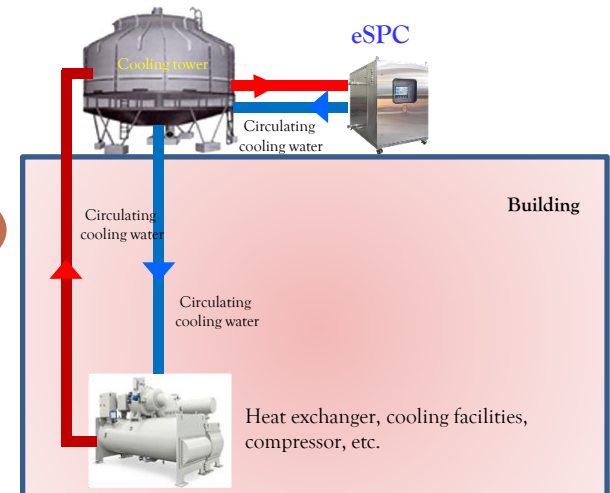
※除垢裝備的安裝位置

Installation location of scale removal equipment

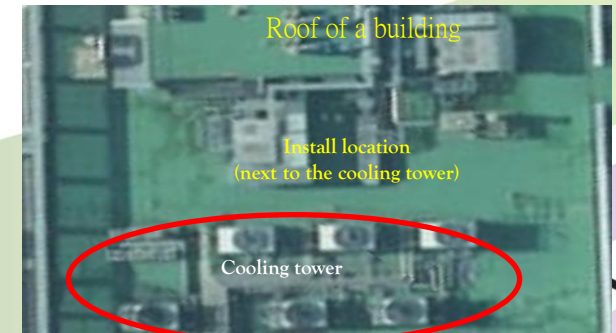
安裝在冷卻塔（或冷卻循環水塔）旁邊

Installed next to the cooling tower

(or cooling circulation water storage tank)



✓ Example of the install location



預防環境汙染
Prevention of environment pollution

省水
Water saving

節能
Electric energy saving

eSPC

減少化學藥劑消耗
Reduction of the chemical cost

降低維護成本
Reduction of the maintenance cost

改善熱交換效率
Efficiency improvement of the heat exchange

eSPC的作用_環境方面

The effect of eSPC _ Environmental aspect

省水 Water Saving

減少水排放和化學藥劑（阻垢劑）→省水和減少廢水的效果

- Reduction of Water Blow-down & Chemicals (Scale Inhibitors) → Effect of saving Water & Waste water



省水 Water Saving



減少廢水
Waste water reduction

碳中和2050淨排放 Carbon Neutrality 2050

減少熱交換器的能量損失 → 節省電能 & 減少溫室氣體排放

- Energy Loss Reduction of Heat Exchanger

→ Saving electric energy & Reducing greenhouse gas



CO2 emission per 1kWh electricity

472.4 CO₂ eq. gram/kW

節省電能
Electric Energy Saving

減少碳排放
Carbon emissions reduction

產品概覽 Product Overview

採用電解技術的除垢設備

Scale removal equipment by using electrolysis technology

1

通過電解過程溶解的 Ca^{2+} (鈣)、 Mg^{2+} (鎂)、 SiO_2 (二氧化矽) 以 CaO (氧化鈣) 的形式在負極上還原後自動排放，從而防止冷卻系統管道的冷卻水形成水垢。

Scale formation in the pipe of the cooling system is prevented by automatic discharge after extraction in a form of CaO (Calcium oxide) reduced on the cathode through the electrolysis process of Ca^{2+} (Calcium), Mg^{2+} (Magnesium), SiO_2 (Silicon dioxide) dissolved in the cooling water.

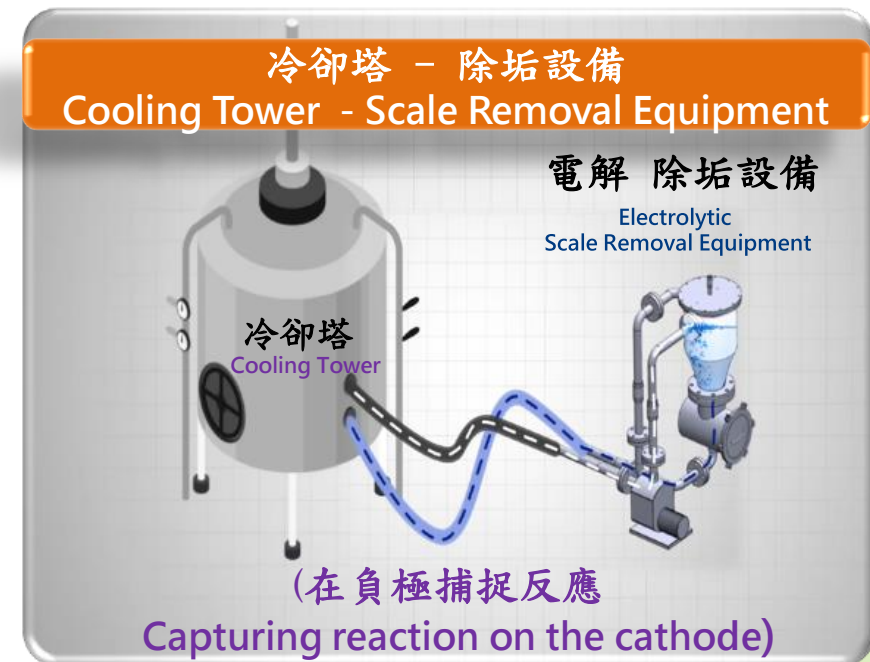
2

當冷卻水在HVAC系統中循環時，SPC將冷卻塔、循環管、熱交換器等循環系統中附著的水垢中的水垢誘導物質帶走。

冷卻水經過電解反應失去陽離子（水垢包含礦物質）後，使附著在內管上的水垢的結合力逐漸減弱，以保持離子平衡。

While the cooling water is circulating in the HVAC system, the SPC takes away the scale inducing materials from the existing scale attached to the circulation system such as the cooling tower, circulation pipe, heat exchanger, etc.

The cooling water after losing cation (scale inducing materials) through electrolysis reaction make the combining power of the scale attached on the inner pipe weaken gradually in order to keep an ionic balance.



※不適用於水 (ROW·DIW) 和設備
(EHP·GHP Not applicable to the waters (ROW, DIW) and equipments (EHP, GHP))

eSPC的效果_降低成本

The effect of eSPC _ Cost Reduction

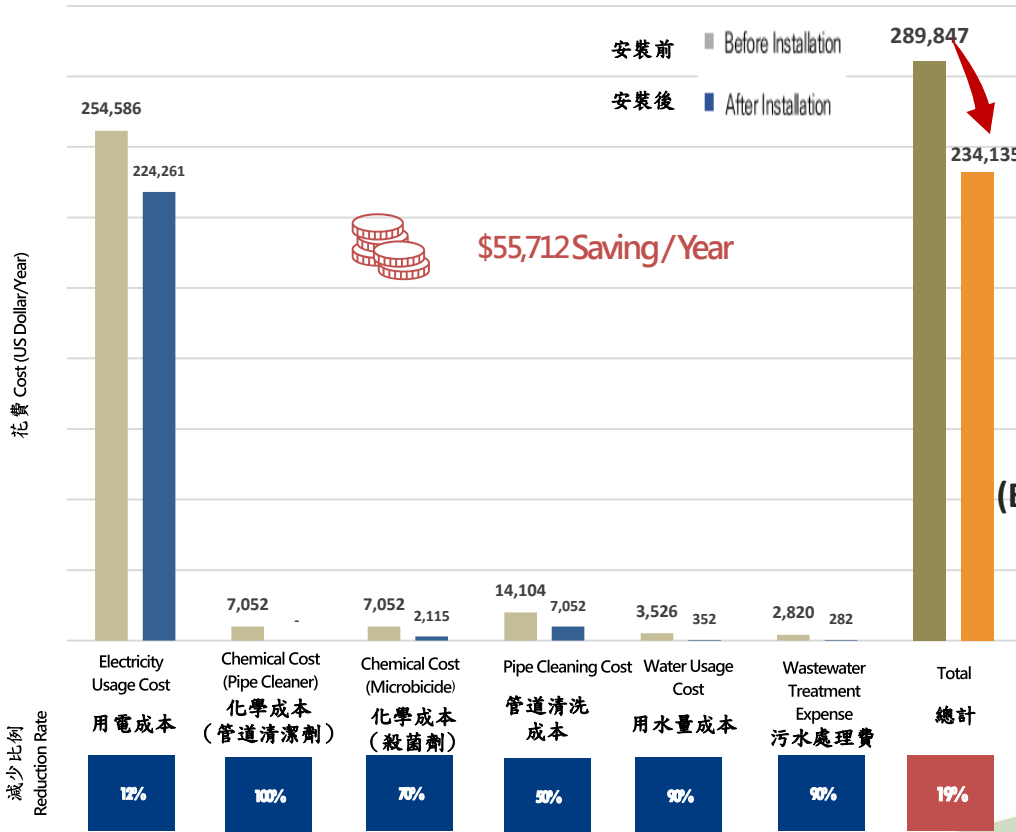
減少營運成本模擬 Operation Cost Reduction Simulation

基於冰箱 500RT 的成本降低模擬

✓ Cost reduction simulation on a refrigerator 500RT basis

溫室氣體排放模擬 GHG Reduction Simulation

(通過減少電能消耗 by Electric Energy Consumption Reduction)



每年減少用電量
Annual Electricity Usage Reduction (12% ↓)

394,200 kW



CO2 CER* Cost Saving (Based on the Korea market price)

\$4,596 /Year

每年二氧化碳減排量
Annual CO2 Emission Reduction

186 CO₂ eq Ton/Year

Where, 1kW = 472.4 CO₂ eq gram/year

節省成本 Cost Saving

CO₂ CER Cost Saving

\$14,183 /Year

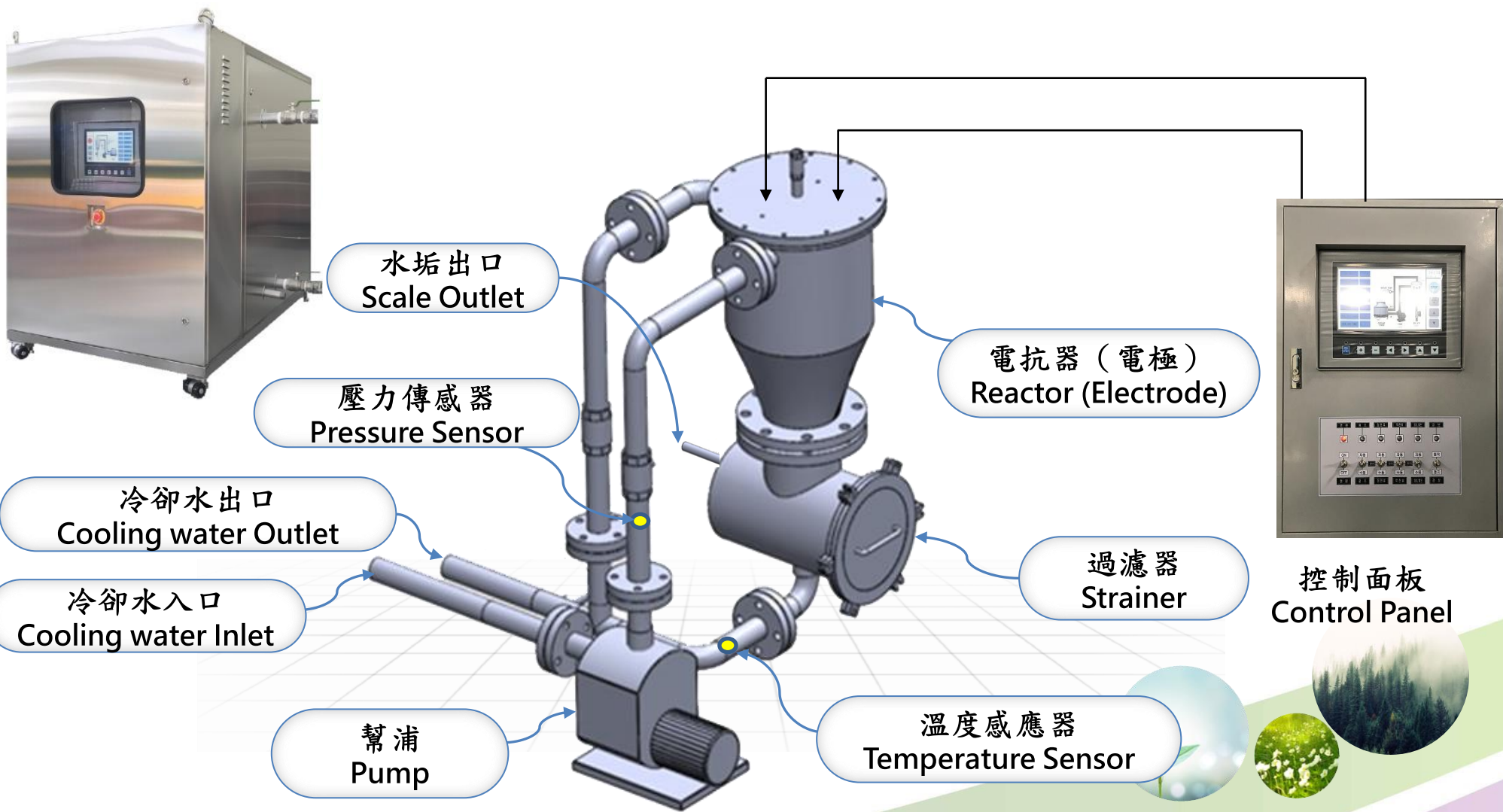
*CER: 認證減排量
Certified Emission Reduction

引進 eSPC 的效果比較

Comparison of effects by introducing eSPC

1	類別 Category	無eSPC without eSPC	有eSPC with eSPC	備註 Remarks
2	冷卻設施清潔 Cooling facility cleaning	1-2年期限 1-2 years term	X	節省巨額清潔費用 Saving huge cleaning costs
3	冷卻水排放補充 Blow-down of the cooling water	0	X	節省大量用水和成本 保護水資源 Saving huge water usage, costs and Protecting water resources
4	廢水處理 Waste water disposal	0	X	節省巨額成本和保護環境 Saving huge costs and Protecting environment
5	防垢化學品 Antiscale chemicals	0	X	不需要化學品，並環境保護產生貢獻 No chemicals are needed and Contributing environment protection
6	殺菌 Bactericide	0	△	可節省 70-80% 的使用量 Savable 70~80% of usage
7	電費 Electricity cost	巨大的耗能 huge energy loss	大量節省 savable huge amount	節省巨額成本和減少碳排放 Saving huge costs and Reducing carbon emissions
8	延長HVAC設施壽命 Lifespan extension of the HVAC facilities	X	0	延長 HVAC 設施的使用壽命 通過去除水垢而不使用化學藥劑和機械清潔 Extending lifespan of the HVAC facilities by removing scales and without using chemicals and mechanical cleaning
9	主要運作停機 Main operation shutdown	2-3天 2-3 days	X	生產/發電關閉，建築物沒有冷卻能源，冷藏庫等 Production/generation shutdown, no cooling energy to the building, refrigeration warehouse and so on

設備概況（結構） Equipment Overview (Structure)



主功能 Main Function

10.2吋LCD觸控面板
Touch LCD Panel (10.2 inch LCD)

自動電流控制
Automatic Electric Current Control

自動排放水垢
Automatic Scale Discharge

自動電極清洗
Automatic Electrode Cleaning

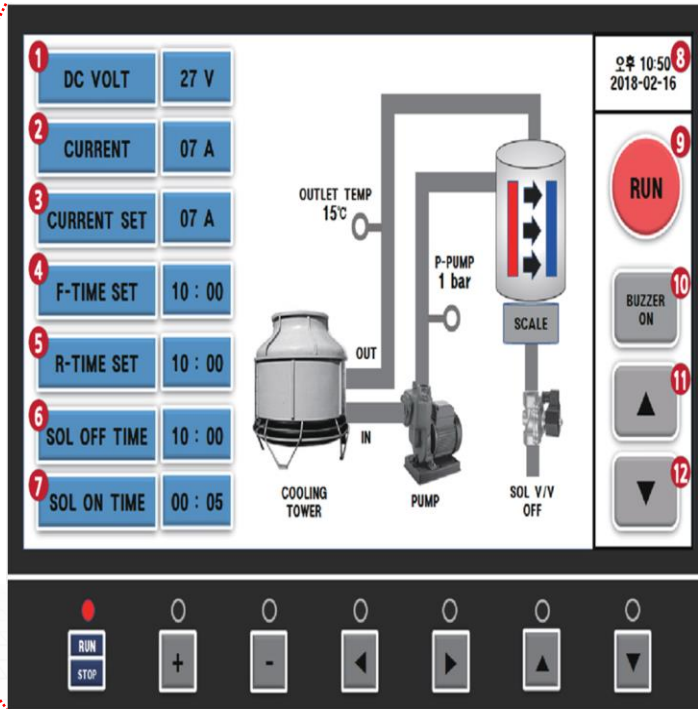
自動或手動操作
Automatic or Manual Operation

遠端通訊及控制 (PC & 手機)
(Option) Remote Communication and Control
(PC & Mobile Phone)



螢幕設計- (觸控模式)

Screen Design – Premium (Touch panel type)



NO	표시내용
1	Applied Voltage (Electrode)
2	Applied Current (Electrode)
3	Applied Current Setting
4	Forward Time Setting
5	Reverse Time Setting
6	SOL V/V Off Time Setting
7	SOL V/V On Time Setting
8	Date & Time Display
9	Operation & Stop Button
10	Alarm On/Off Setting
11	Set Value Increase button
12	Set Value Decrease button

可遠程通訊和控制

(Option) Remote
Communication & Control



應用 Application

適用於所有使用循環冷卻水系統的領域 Applicable to all areas using the circulating cooling water system



目標顧客 Target Customers

倉庫: 冷藏/冷凍庫 Warehouse: Refrigeration/Freezing warehouse

製造商: 半導體、顯示器、電子/電力、食品和飲料、煉油廠、化學品、鋼鐵廠、塑料加工品廠商等等
Manufacturing: Semiconductor, Display, Electronics/Electricity, Food & Beverage, Refinery, Chemicals, Steel mills, Plastic processed goods, etc.

大型建築: 酒店、大型商辦、百貨公司、購物中心、數據中心等。

Large buildings: Hotel, Large office building, Department store, Shopping center, Datacenter, etc.

公家部門: 醫院、展覽中心、機場、發電廠、大型實驗室、政府大樓等

Public sectors: Hospital, Convention/Expo center, Airport, Power plant, Large laboratory, Government building, etc.

安裝案例 Installation Case

在工業用地安裝除垢設備

Installation of scale removal equipment at industrial site

1. 型號 Model : SPC-1000A × 2ea
2. 運作時間 Operation Period : 05 August, 2019 ~ Current
3. 水垢收集檢查日期 Scale Collection Inspection Date : 30 August, 2019
4. 安裝設施 Installation Facility : Cooling Tower 1000RT × 3ea



安裝照片 Installed Picture



過濾器中收集的水垢圖片(安裝後 3 週)

- 自動釋出功能關閉狀態

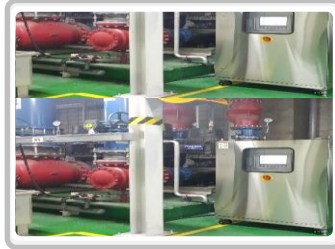
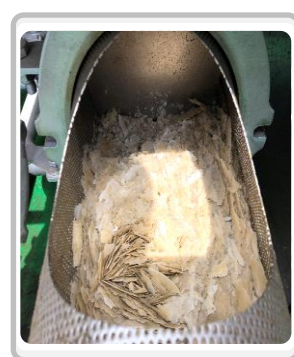
(可切換至自動釋出確認手動採集後的模式)

Picture of scale collected in the strainer (3 weeks after operation)
- automatic discharge function off status (switchable to automatic discharge mode after confirmation of manual scale collection)

安裝案例 Installation Case

收集到的水垢的顏色取決於水質和空氣品質

✓The color of collected scale depends on the water & air quality



安裝案例_水垢成分分析

Installation Case _Scale Composition Analysis



BEYOND ASIAN HUB, TOWARD GLOBAL WORLD

KTR
Korea Testing & Research Institute

TEST REPORT

우 13810 경기도 과천시 교육원로 88(중랑동) TEL 043211-6144 FAX 043211-6148
 성직서번호 : TAK-2021-174212 접수 일자 : 2021년 12월 07일
 대표 자 : 김선덕 시험완료일자 : 2021년 12월 21일
 업 제 명 : (주)KOSME텍
 주 소 : 충청북도 청주시 서원구 송대로 1, 47호 (개신동, 학원산공통기술연구원)

시 료 명 : (스캐일)H 청주공장 설치 후 - 1(SPC-1000A)

시험결과

시험항목	단위	시료구분	결과치	시험방법
SiO ₂	%	-	1.74	KS L 3316 : 2014 (준용)
CaO	%	-	52.7	KS L 3316 : 2014 (준용)
MgO	%	-	1.74	KS L 3316 : 2014 (준용)
SO ₃	%	-	0.12	KS L 3316 : 2014 (준용)
Na ₂ O	%	-	0.00	KS L 3316 : 2014 (준용)

- 용 도 : 제철용(한국환경산업기술원)

비 고 : 1. 이 성적서는 의뢰자가 제시한 시료 및 시료명으로 시험한 결과로서 전체 제품에 대한 품질을 보증하지 않으며, 성적서의 진위확인용 홈페이지(www.ktr.or.kr) 또는 QR code로 확인 가능합니다.
 2. 이 성적서는 홍보, 선전, 광고 및 소송용 등으로 사용될 수 없으며, 용도 이외의 사용을 금합니다.
 3. 이 성적서는 원본(제발행 포함)만 유효하며, 사본 및 전자 인쇄본/파일본은 결과치 참고용입니다.

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2021년 12월 21일

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根據水垢成分分析，
CaO(氧化鈣)含量最多，為52.7%

According to the analysis of the scale composition,
CaO(Calcium oxide) accounted for the most 52.7%
(Reference: KTR (Korea Testing & Research Institute) Test Report)

安裝案例_水質改善

Installation Case _ Water Quality Improvement

項目 Items	單位 Unit	A 公司			B 公司			C 公司		
		安裝前 Before Operation	安裝後(約142天) After Operation (After 142 days)	改善率 Improvement rate	安裝前 Before Operation	安裝後(約76天) After Operation (After 76 days)	改善率 Improvement rate	安裝前 Before Operation	安裝後(約392天) After Operation (After 392 days)	改善率 Improvement rate
導電率 Electrical conductivity	µS/cm	970	676	30%	771	547	29%	17,000	4,940	71%
鈣硬度 (碳酸鈣) Ca Hardness (as CaCO ₃)	mg/L	161	81	50%	123	91	26%	1,120	1,100	2%
鎂硬度 (碳酸鈣) Mg Hardness (as CaCO ₃)	mg/L	61	35	43%	44	31	30%	2,830	325	89%
M-鹼度 (碳酸鈣) M-Alkalinity (as CaCO ₃)	mg/L	116	82	29%	128	82	36%	184	81	56%

❖ The improvement of water quality can be varied with initial cooling water quality and environment of installation site.

安裝案例_除垢

Installation Case _ Existing Scale Removal

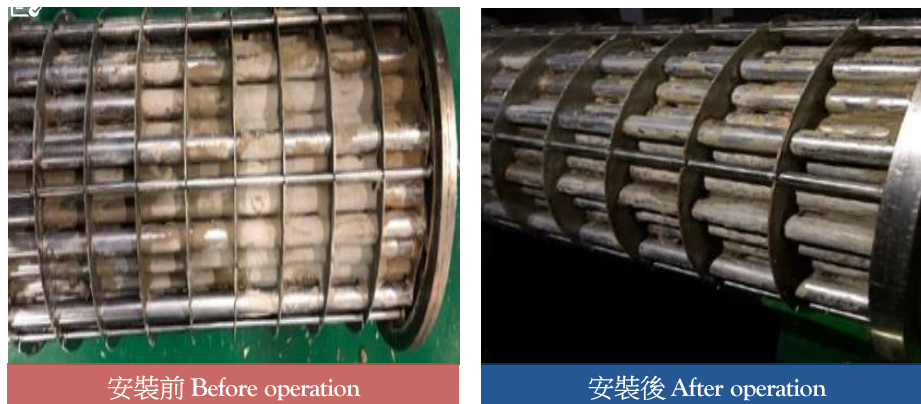
冷卻塔上水箱狀態對比 安裝後60天

Comparison of the upper tank status of the cooling tower 60 days after installation



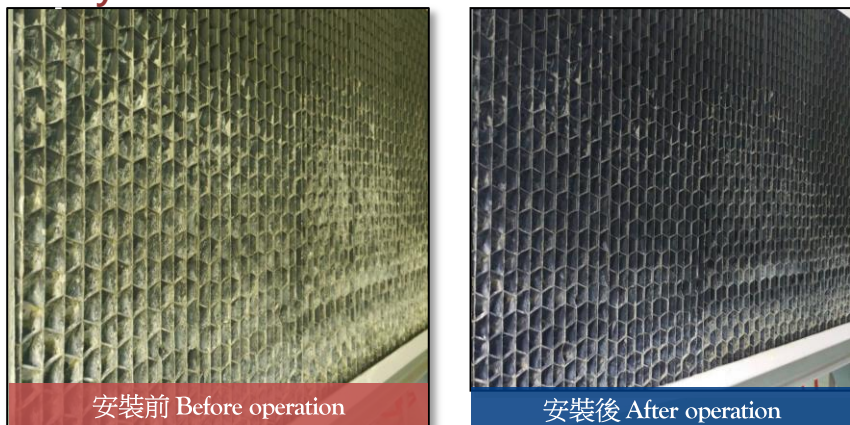
熱交換器狀態對比 安裝後150天

Comparison of the heat exchanger status 150 days after installation



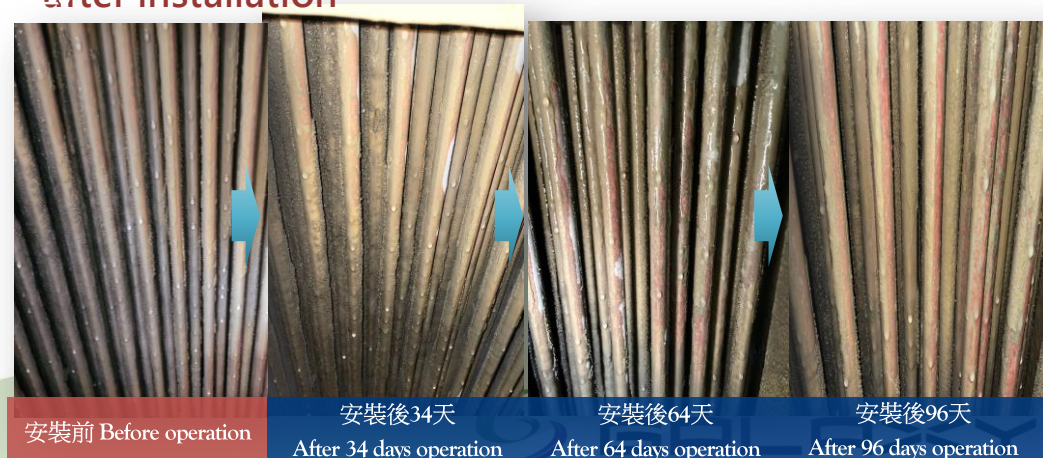
冷卻塔除水器狀態對比 安裝後35天

Comparison of the cooling tower eliminator status 35 days after installation



冷卻塔盤管狀態對比 安裝後 00 天

Comparison of the cooling tower coil status 00 days after installation



產品規格 Product Specifications



	型號1 Model 1	型號2 Model 2	型號3 Model 3
型號 Model	SPC-300A	SPC-500A	SPC-1000A
目標設施 Target Facility	Cooling Tower 100~300RT	Cooling Tower 400~600RT	Cooling Tower 700~1200RT
容量 Capacity	7m ³ /hr	10m ³ /hr	20m ³ /hr
吸入/排出高度 Suction/Discharge Height	8M/13M (MAX)	8M/13M (MAX)	8M/19M (MAX)
輸入功率 Input Power	Single Phase AC220V / 60Hz	Single Phase AC220V / 60Hz	Single Phase AC220V / 60Hz
能量消耗 Power Consumption	2.7kW (MAX)	2.7kW (MAX)	3.6kW (MAX)
電極壽命 Electrode Life Time	3 years (5A, 365 days, 24hr)	3 years (5A, 365 days, 24hr)	3 years (5A, 365 days, 24hr)
管道直徑 Pipe Diameter	Water Supply-40A, Water Discharge -40A, Drainage-40A	Water Supply-40A, Water Discharge -40A, Drainage-40A	Water Supply-50A, Water Discharge -50A, Drainage-40A
尺寸 Dimension	W:1150 / L:960 / H:1250	W:940 / L:1500 / H:1250	W:940 / L:1640 / H:1440
重量 Weight	310kg	380kg	440kg

銷售情況 Sales reference

- ▶ 已向韓國、波蘭、越南的80家大公司銷售150台設備 (LG化學、TCK、樂天、東麗、忠北大學等)
Sold 150 pieces of equipment to 80 big companies in Korea, Poland, and Vietnam (LG Chemicals, TCK, Lotte, Toray, Chungbuk National University, etc.)
- ▶ 目前接洽中 熱電廠、空氣煤氣廠、Hanwha Qcells、Bexco 等
Currently contacting thermoelectric power plants, air gas plants, Hanwha Qcells, Bexco, etc.
- ▶ 目前正準備與韓國政府合作，將 eSPC 全面引入韓國所有行業
Currently preparing to introduce eSPC on full-scale to all industries in Korea in collaboration with the Korean government



“很多客戶還沒有選擇。但是，沒有客戶後悔選擇我們的產品。”

“Many customers haven't chosen yet. However, no customers regret their choice of our product.”



Thank You for Your Cooperation

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