



TR' ENETEC

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Scale Removal Device (SRS-K)

Product Description



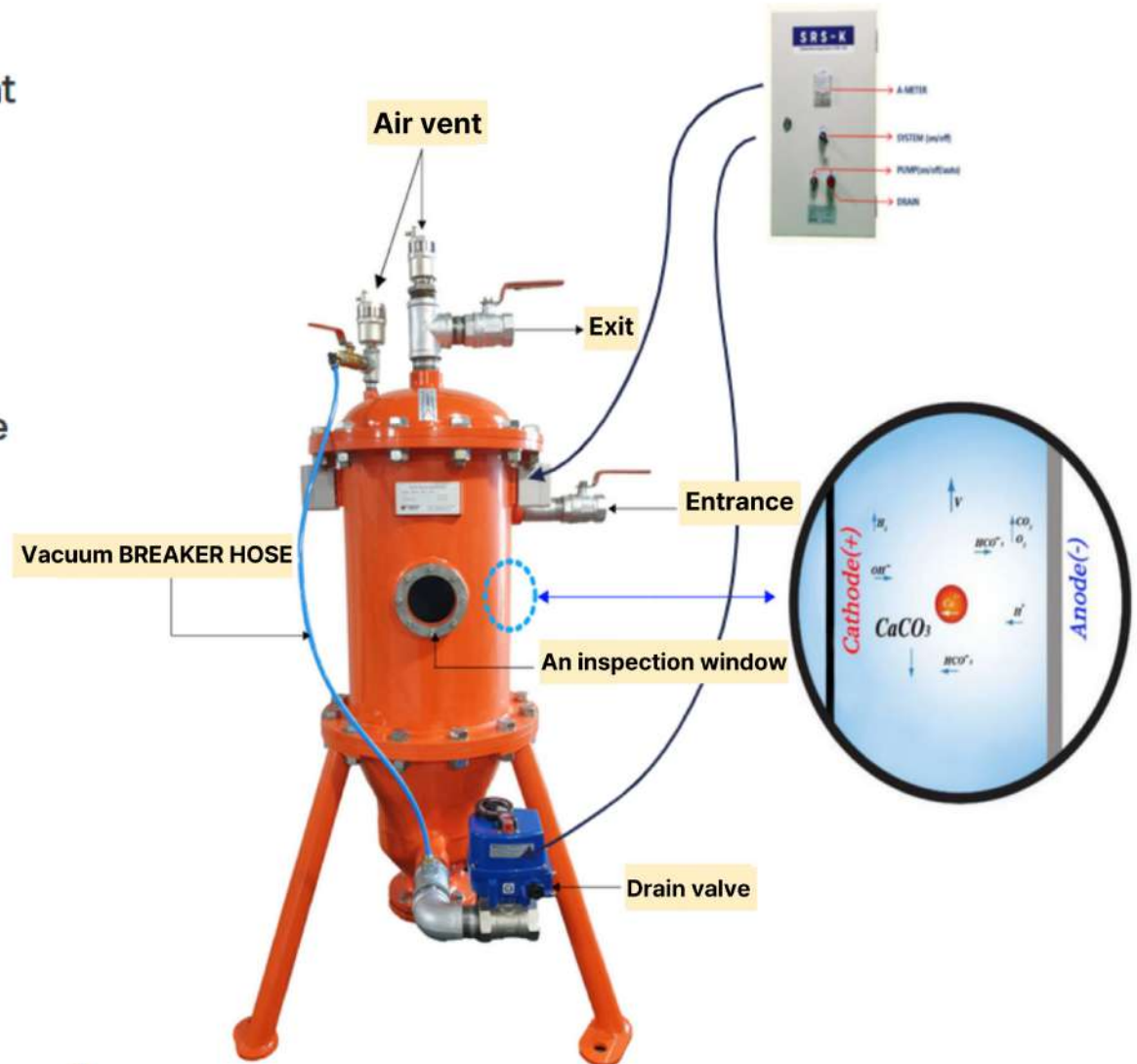
A PRESENTATION ABOUT

- 1. Introduction of scale removal devices** ----- 1p
 - 2. Types and main causes of coolant pollution** ----- 5p
 - 3. How to install the scale removal device** ----- 8p
 - 4. Installation effect of scale removal device** ----- 12p
 - 5. Expected Effect of Installing Scale Removal Device** ----- 17p
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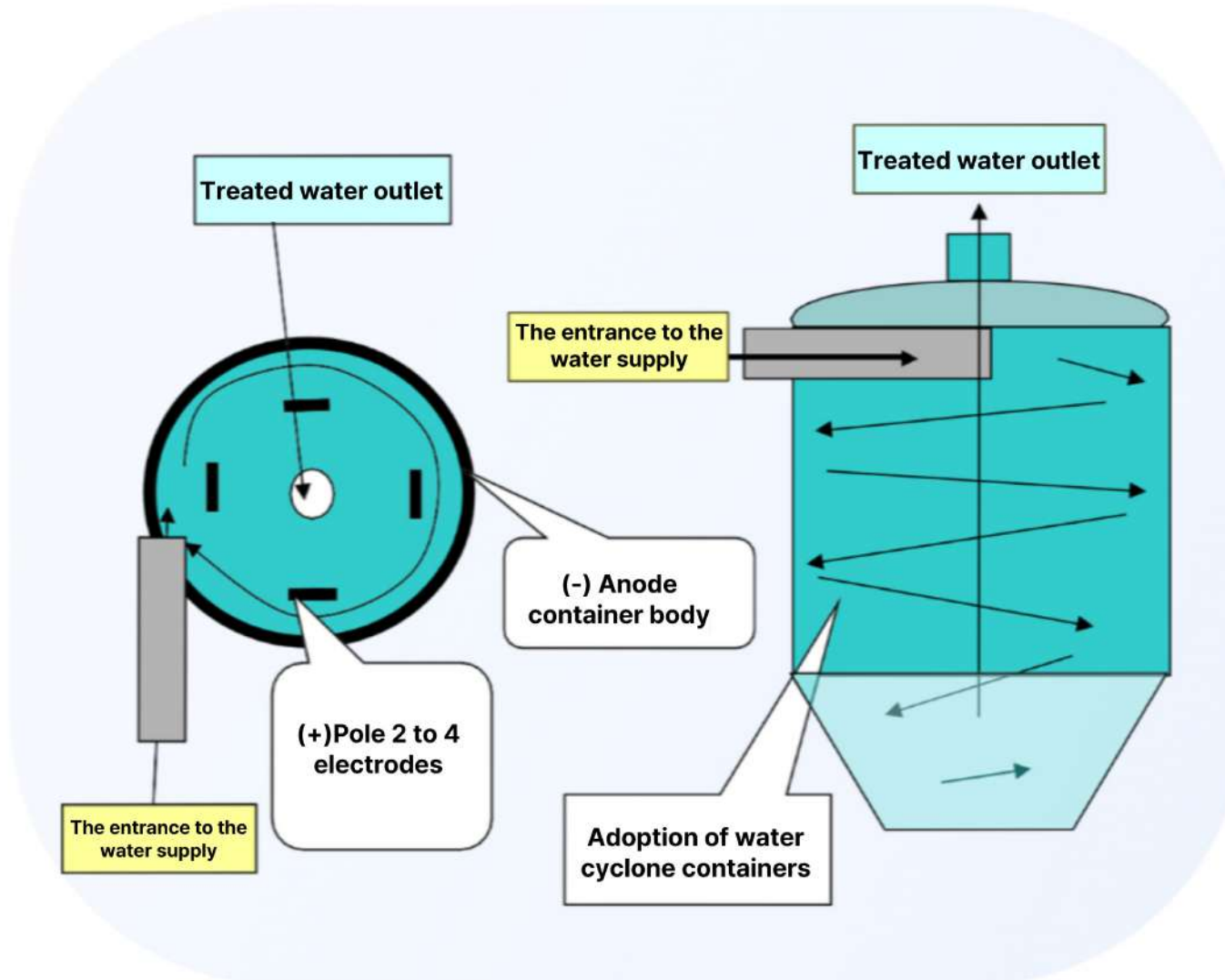
Introduction to scale removal devices

Control the potential scale of 5%

- Ions (Ca^{2+} , Mg^{2+} , etc.) dissolved in the coolant
The scale is formed by saturating crystallization by temperature change.
- The temperature change of the cooling water during circulation is usually within 10°C , and the amount of ions that can be deposited at this time is within 5%.
- By pre-removing 5% with scale potential, scale formation is fundamentally prevented.
- Coolant with 5% ion component removed acts to melt the scale in the system to maintain equilibrium, removing the existing scale already formed in the system.



How the scale removal device works



The operating principle of the device

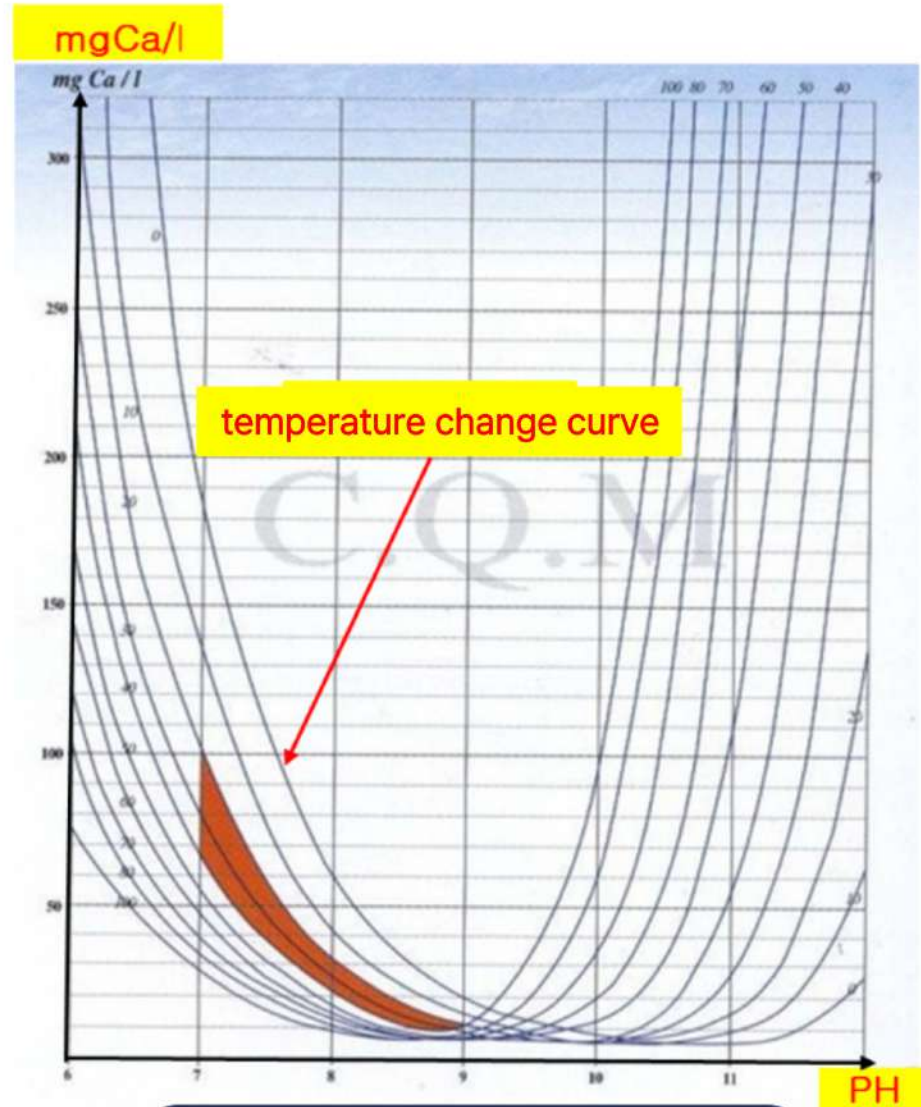
1. Principle of Electrolysis by DC Power
2. Adopting cyclone containers to maximize water retention time
3. 2-4 Anodes (+) : Special Material
4. The container body is composed of a cathode
5. The cation components and deposits deposited around the cathode are discharged to the outside through a periodic flushing process.
6. The production of a small amount of chlorine (Cl_2) in the electrolysis process reduces bacteria
7. The scale of precipitation in the container is periodically removed from cleaning (about once every 3-6 months)

Reaction inside the scale removal unit

Reaction formula

Cathode	Anode
$\text{Mg}(\text{HCO}_3)_2 + 4\text{OH}^- \rightarrow \text{Mg}(\text{OH})_2 \downarrow + 2\text{H}_2\text{O} + 2\text{CO}_3^{2-}$	$\text{HO}^- - e \rightarrow \text{OH}^0$
$\text{Ca}(\text{HCO}_3)_2 + 2\text{OH}^- \rightarrow \text{CaCO}_3 \downarrow + 2\text{H}_2\text{O} + \text{CO}_3^{2-}$	$2\text{OH}^0 \rightarrow \text{H}_2\text{O} + \text{O}^0$
$\text{Mg}(\text{HCO}_3)_2 \rightarrow \text{MgCO}_3 \downarrow + 2\text{H}_2\text{O} + \text{CO}_2 \uparrow$	$2\text{OH}^0 \rightarrow \text{H}_2\text{O}_2$
$(\text{SiO}_2)_{\text{aq}} \rightarrow (\text{SiO}_2) \downarrow$	$\text{Cl}^- - e \rightarrow \text{Cl}^0$
	$2\text{Cl}^0 \rightarrow \text{Cl}_2$
Remove the scale	Sterilization, corrosion prevention

Changes in water quality after installation of scale removal devices



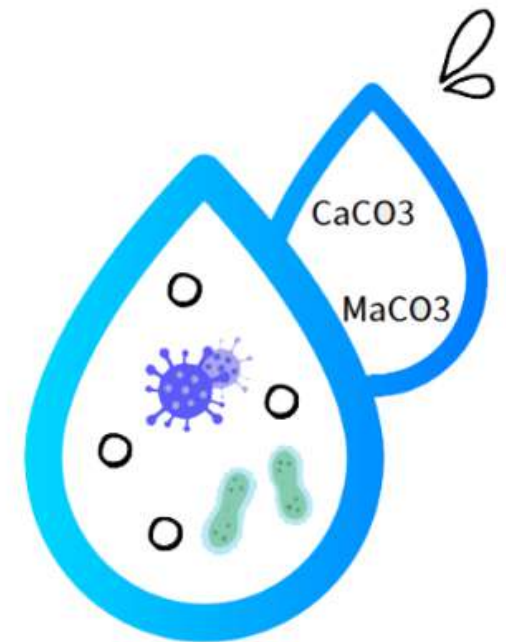
CaCO₃ saturation curve

1. Calcium is precipitated/dissolved by temperature changes..
2. SRS-K is 5% calcium deposited
This means capturing and eliminating potential scales in advance.
3. Resolve the scale issue of the coolant circulation system in an economical and eco-friendly way.

2

Types and main causes of coolant pollution

kind	The main cause
Scale	calcium carbonate, magnesium carbonate
Slime	Bacteria, Green algae
Sediments	Fine dust, Chemical deposits



Substances that are the main sources of coolant contamination



- **Scale** - Calcium salts and magnesium salts dissolved in water are precipitated as the temperature changes within the circulation system and adhere to the metal surface.

- **Suspended substances** - Smoke, fine dust, pollen, etc. introduced from the outside, and chemical precipitates by injection of water treatment drugs circulate through the circulation system and deposit in areas with slow flow rates.



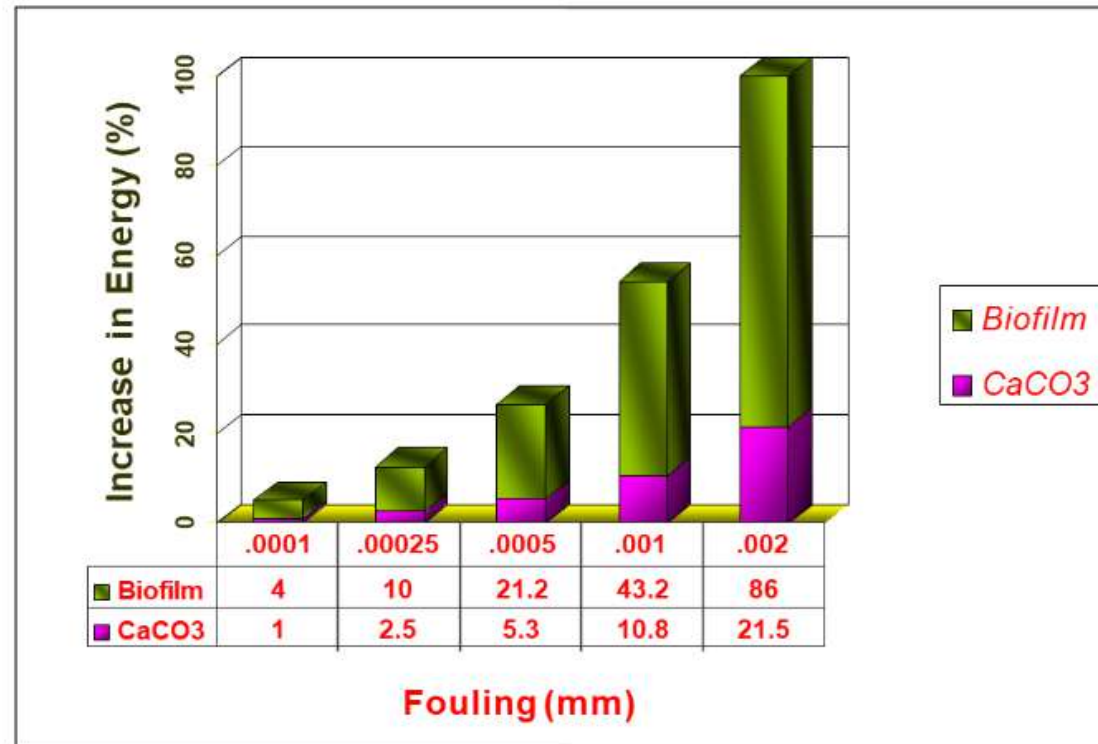
- **Slime** - Microorganisms such as bacteria multiply by feeding on protozoa such as amoeba to form a biofilm (slime). In addition, it drives cooling tower contamination along with green algae that reproduce by photosynthesis.

Substances that are the main source of contamination in cooling towers

Biofilm

- A hotbed of microbial growth
- Heat transfer inhibitors 4x the scale
- 14 days after microorganism attachment, biofilm formation
- rapid proliferation through nutrients, moisture, and sunlight

Additional energy consumption due to scale and biofilm



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SRS-K**

Scale Removing System Korea : installation method

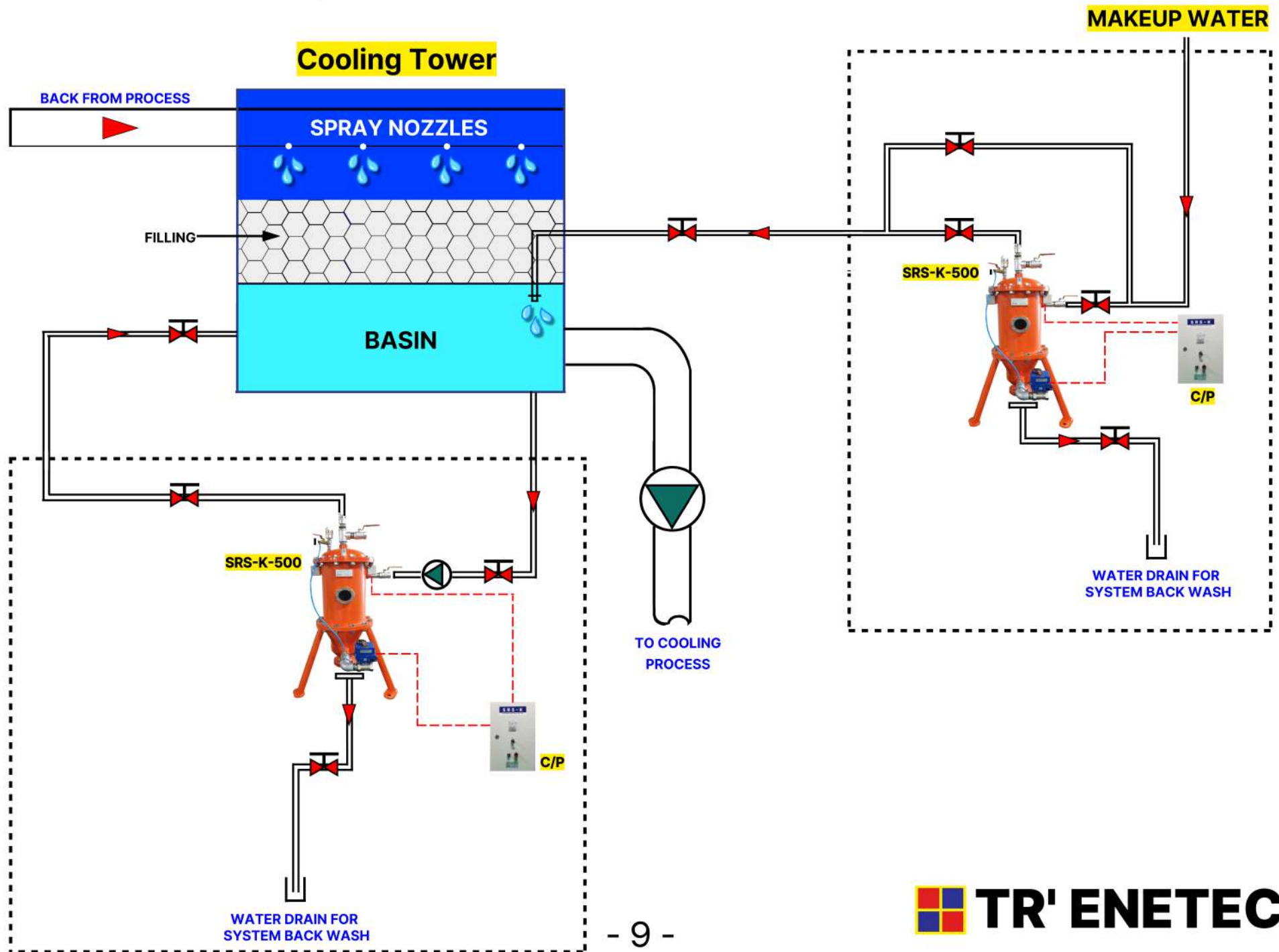
**SRS-K
(500RT)**



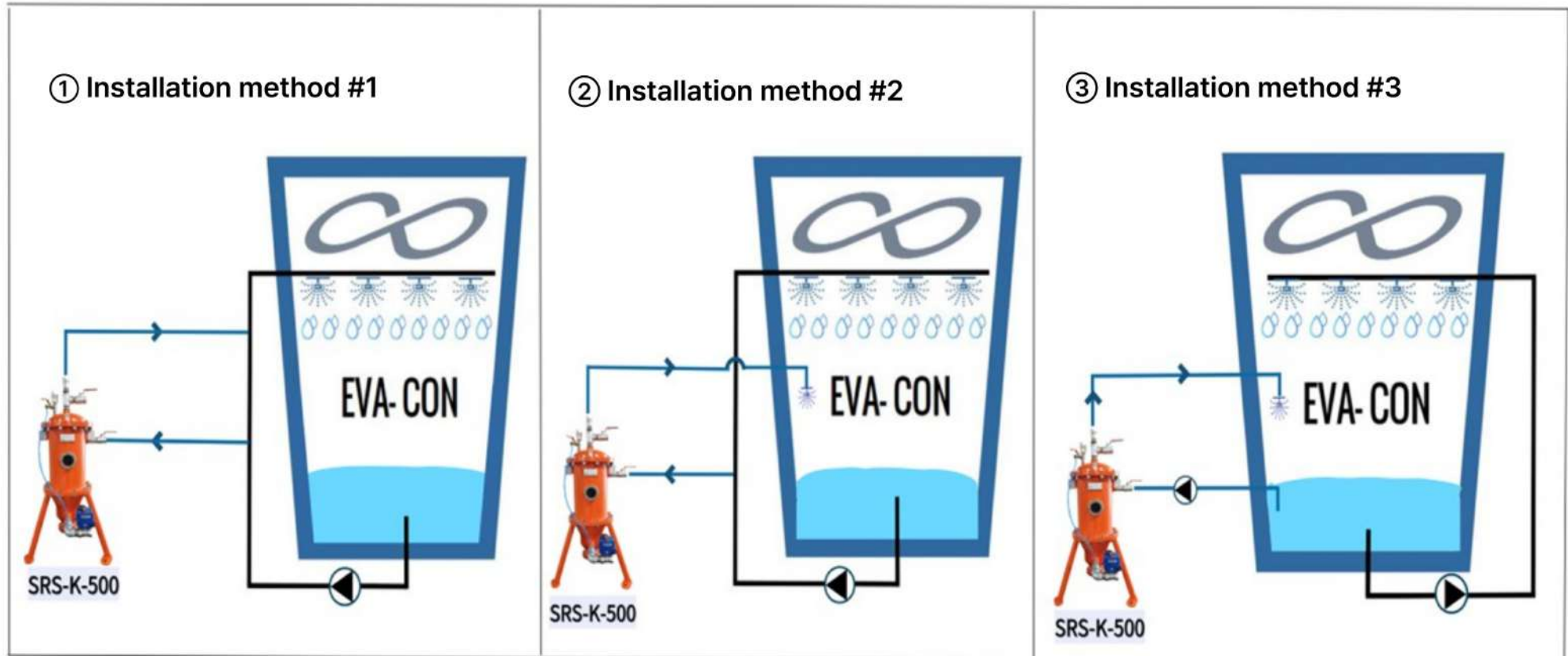
**SRS-K
(750RT)**



How to install



Installation Method of Scale Removal Device (SRS-K-500) / EVA-CON



[SONY Thailand Factory]



[Dong-A Otsuka
Chilseo Factory]



[Dongwon Rox
Honam Factory]



[Namyang Dairy's
Gyeongju Plant]



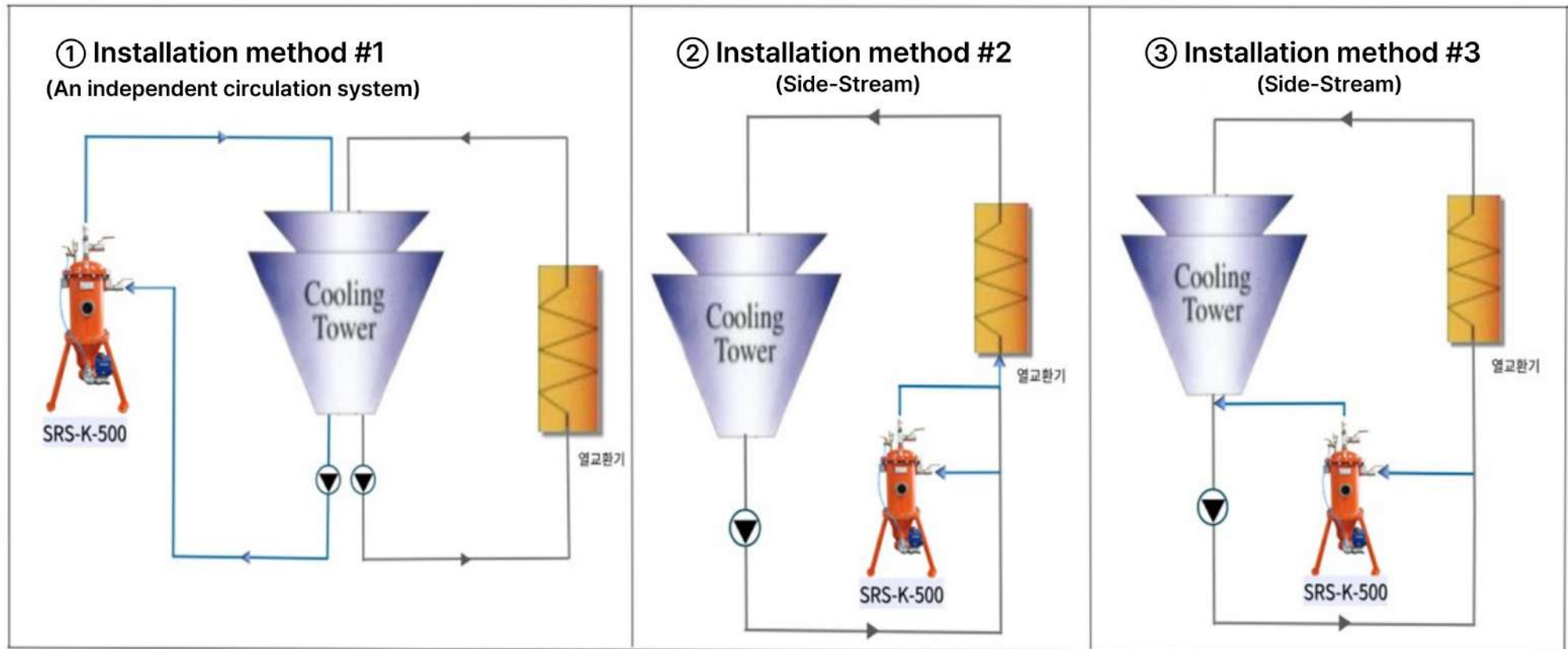
[Hyosung Heavy
Industries Ara Waterway
Logistics Center]



[Coupang
Gwangju Factory]



Installation Method of Scale Removal Device (SRS-K-500) / Cooling Tower



[SONY Thailand Factory]



[Dong-A Otsuka Chilseo Factory]



[Dongwon Rox Honam Factory]



[Namyang Dairy's Gyeongju Plant]



[Hyosung Heavy Industries Ara Waterway Logistics Center]

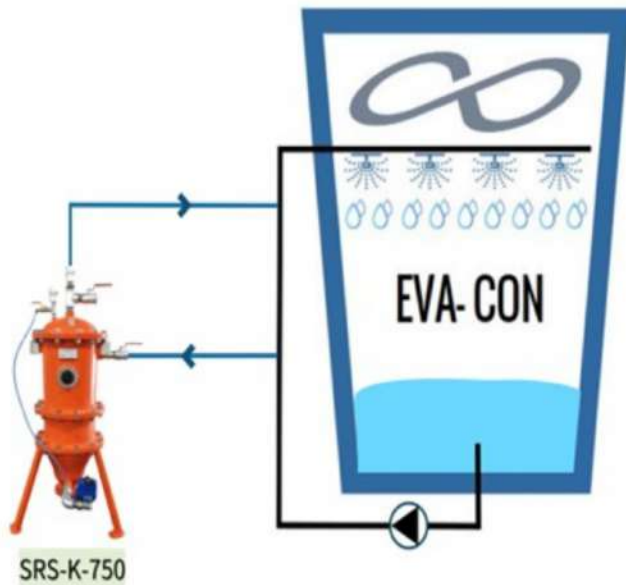


[Coupang Gwangju Factory]

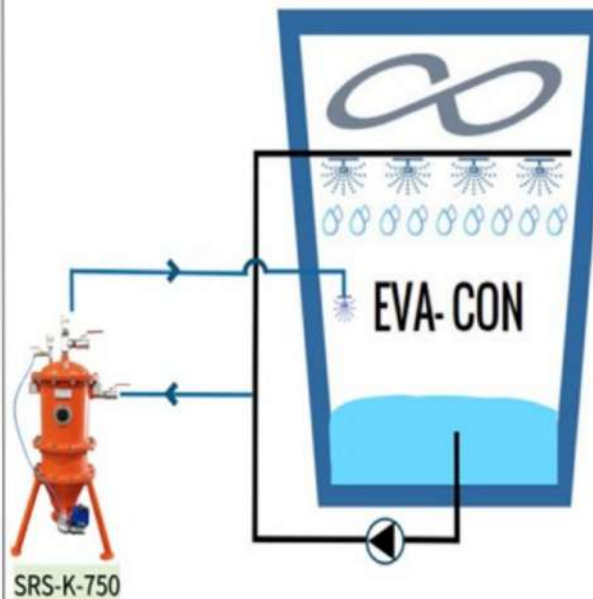


Installation Method of Scale Removal Device (SRS-K-750) / EVA-CON

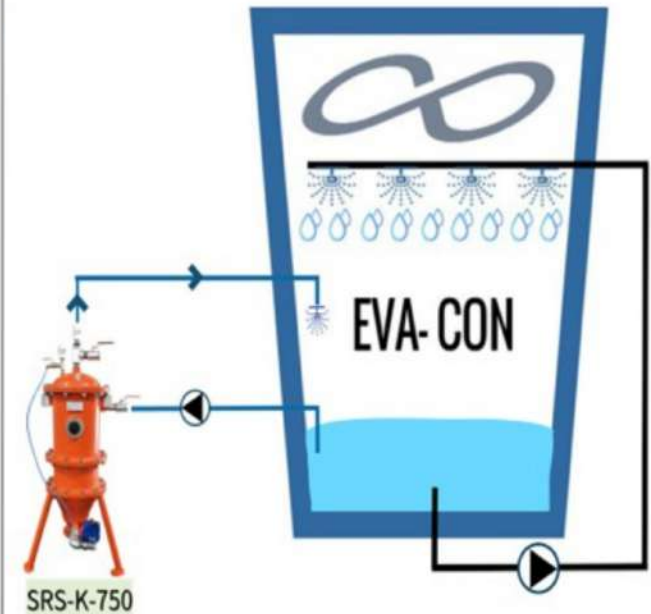
① Installation method #1



② Installation method #2



③ Installation method #3



[SONY Thailand Factory]



[Dong-A Otsuka
Chilseo Factory]



[Dongwon Rox
Honam Factory]



[Namyang Dairy's
Gyeongju Plant]



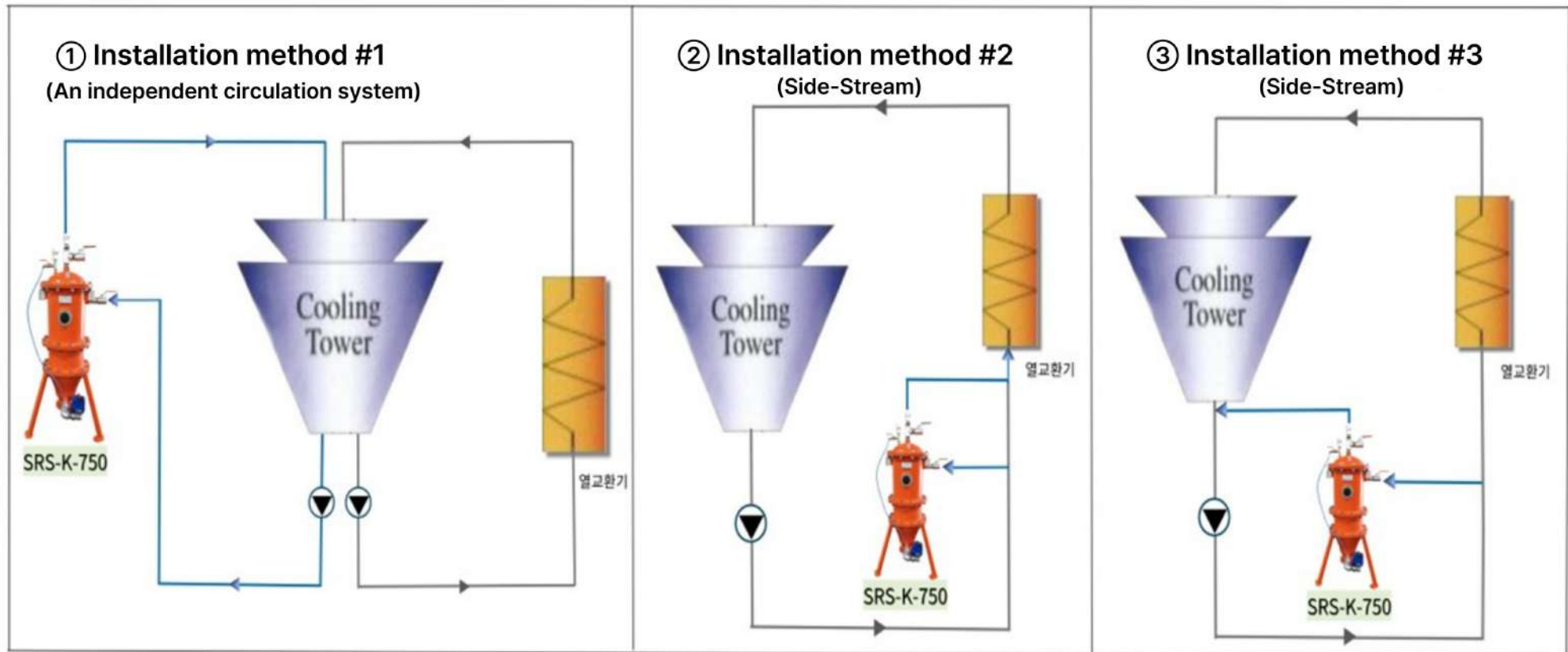
[Hyosung Heavy
Industries Ara Waterway
Logistics Center]



[Coupang
Gwangju Factory]



Installation Method of Scale Removal Device (SRS-K-750) / Cooling Tower



[SONY Thailand Factory]



[Dong-A Otsuka Chilseo Factory]



[Dongwon Rox Honam Factory]



[Namyang Dairy's Gyeongju Plant]



[Hyosung Heavy Industries Ara Waterway Logistics Center]



[Coupang Gwangju Factory]



Installation Effect of Scale Removal Device



Installation effect of equipment

1. 5% calcium capture in coolant
2. Water saving
(drastic reduction of forced drainage)
3. Reduce drug injection costs
4. Reduce maintenance costs
5. Corrosion protection
and longevity of facilities
6. Environmental improvement

Installation Effect of Scale Removal Device

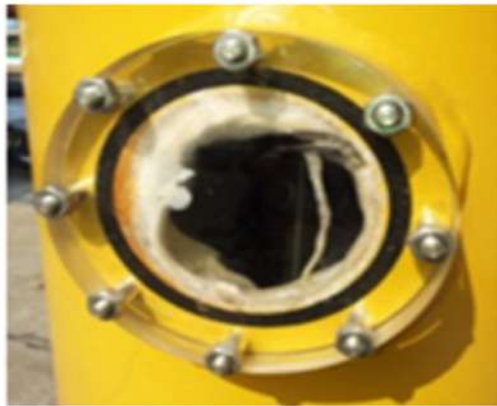


Effect of installation of equipment

1. Improve facility efficiency and prevent scale occurrence within the energy-saving circulatory system.
2. Remove existing scales within the system by gradually dissolving them.
3. Sterilization effect
(Active chlorine generation from chloride)
4. Conversion of cooling water to weak alkaline water to prevent corrosion.

Installation Effect of Scale Removal Device

Collected Scale



The scale collection shown in the inspection window



Scale view captured inside SRS-K



Collected scale appearance

Installation Effect of Scale Removal Device

“H” Company



Before installation



After installation

Examples of changes in water quality after installation of the device

Analytical item	Unit	supplemental water	Circulating water		
			Before installation	A month later	Two months later
Hydrogen ion concentration	pH	7.7	8.8	8.7	8.6
Electrical conductivity	$\mu\text{S}/\text{cm}$	336	1400	750	540
Na	ppm	—	2.6	13	78
Mg	ppm	—	39	20	19
Ca	ppm	52	82	48	50
Cl	ppm	42	220	100	97
SO ₄	ppm	—	190	120	90
Silica	ppm	26	160	98	42



Before installation



1 month after installation



2 month after installation

5 Expected effects from scale removal devices



Scale Removal Device (SRS-K)

SRS-K : Scale Removing System - Korea



1. Reduce Chemical drug costs



2. Water Saving

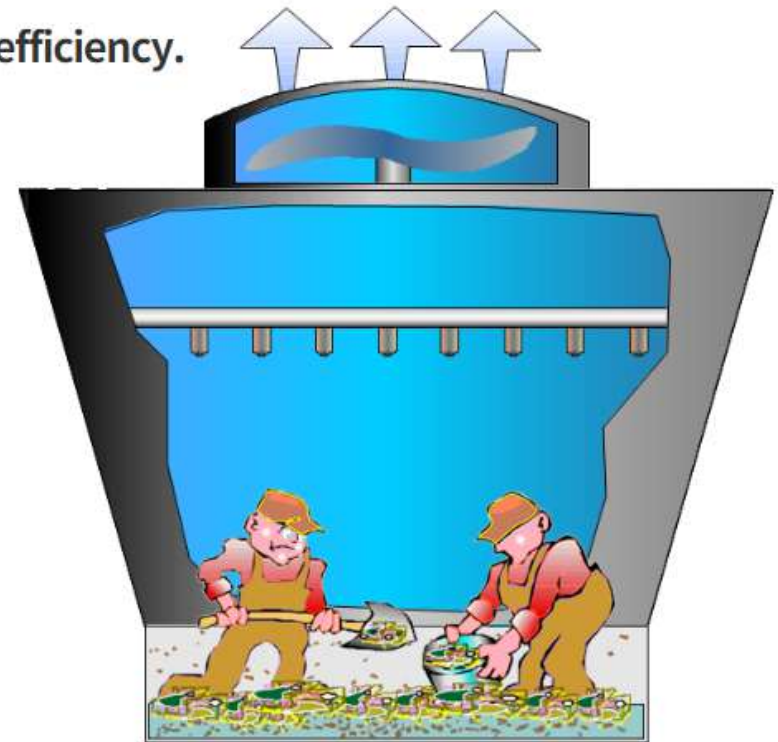


3. Energy Saving

The expected effect of water treatment



- 1 Prevents the production of contaminants such as scale, slime, and biofilm.
- 2 Increase energy efficiency by increasing heat exchange efficiency.
- 3 Prevent rust and corrosion in the system.
- 4 Extension of facility life.
- 5 Prevention of the proliferation of legionella and various microorganisms, forced drainage.
- 6 Water saving by reducing the amount of blow down.
- 7 Reduce maintenance costs for cleaning and customs.



Thank you

TR'ENETEC

This concludes the introduction of SRS-K.

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