



Application of Chemical Cleaning

**TAM DINH COMPANY
LIMITED**





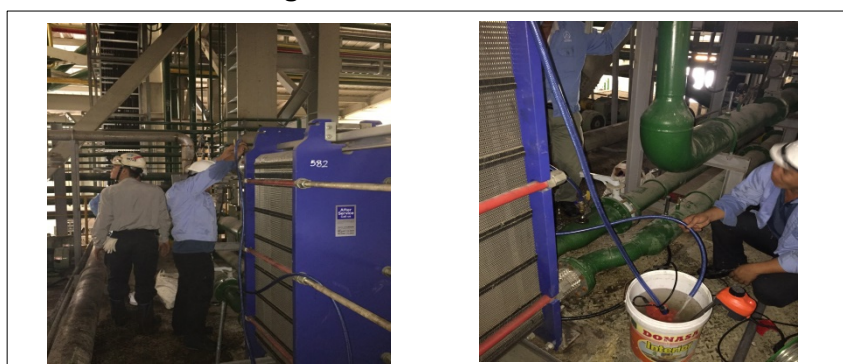
IN VIETNAM



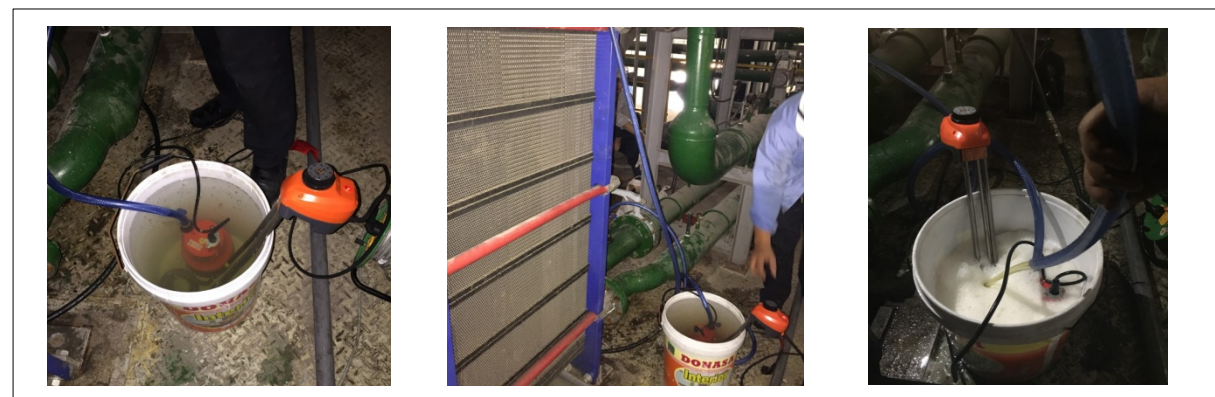
Type		Capacity	-
Equipment	Heat Exchanger	Requirement	-
Applied Company	China Steel	Temperature	60°C
Chemical	KSR-100	Processing Time	3 hours
Dilution Rate		Cleaning Method	Chemical Circulation

※ operation date : Jan. 2017

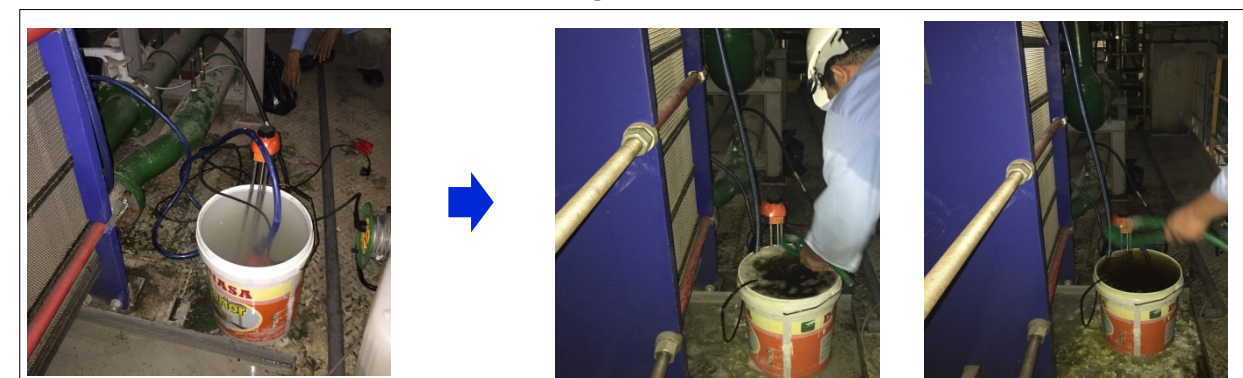
► Chemical cleaning



► Chemical circulation cleaning



► Comparison of before and after cleaning



Type	SHELL TYPE	Capacity	-
Equipment	WATER OIL VOITH TURBO	Requirement	-
Applied Company	CA MAU POWER PLANT	Temperature	60°C
Chemical		Processing Time	4 Hours
Dilution Rate	30%	Cleaning Method	Circulation

※ operation date : Jan. 2017

► Chemical cleaning



► Chemical spray cleaning



► After cleaning



Type		Capacity	-
Equipment	COOLING WATER PIPING, BEARING HOUSING	Requirement	-
Applied Company	CHINA STEEL	Temperature	60°C
Chemical	KSR-1000	Processing Time	8 hours
Dilution Rate		Cleaning Method	Circulation

※ operation date : Feb. 2017

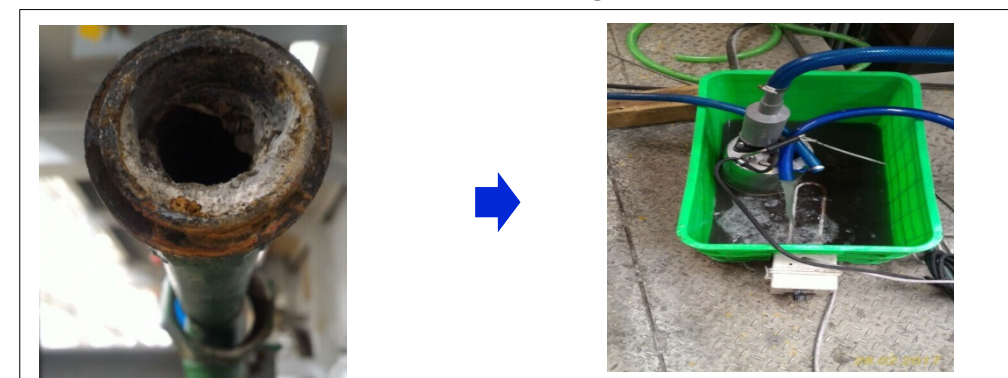
► Chemical cleaning



► Chemical circulation cleaning



► Comparison of before and after cleaning



Type		Capacity	-
Equipment	SHELL TUBE	Requirement	-
Applied Company	CAM PHA CEMENT	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	5 hours
Dilution Rate	25%	Cleaning Method	Circulation

※ operation date : Feb. 2017

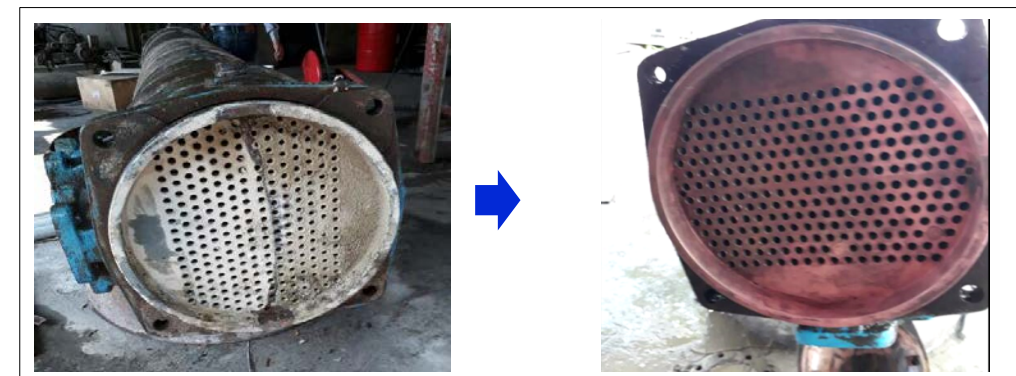
► Chemical cleaning



► Chemical circulation cleaning



► Comparison of before and after cleaning



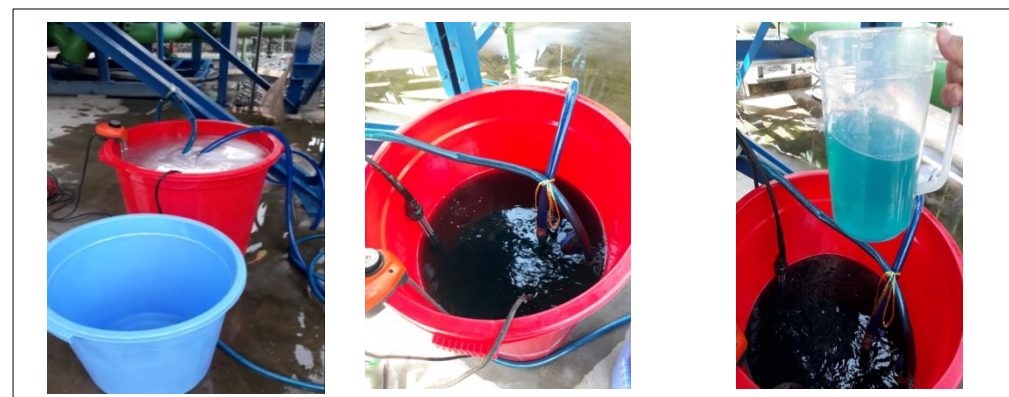
Type		Capacity	-
Equipment	COOLING TOWER	Requirement	-
Applied Company	CA MAU POWER PLANT	Temperature	50°C
Chemical		Processing Time	5 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : June. 2017

► Chemical cleaning



► Chemical Circulation cleaning



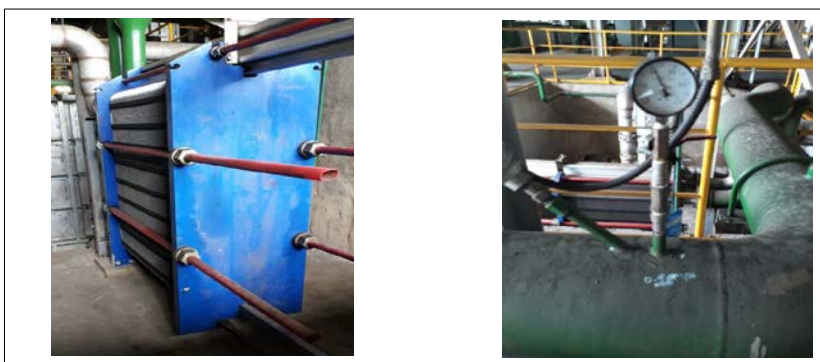
► Comparison of before and after cleaning



Type		Capacity	-
Equipment	HEAT EXCHANGER	Requirement	-
Applied Company	CHINA STEEL	Temperature	50°C
Chemical	KSR - 1000	Processing Time	5 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : June. 2017

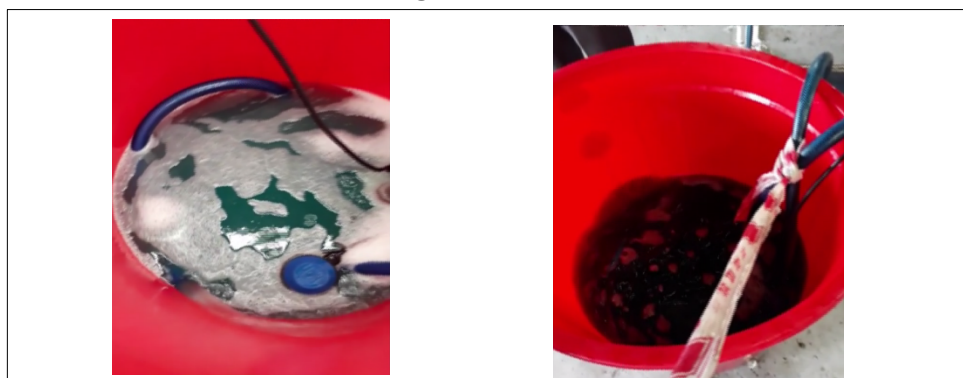
► Chemical cleaning



► Chemical Circulation cleaning



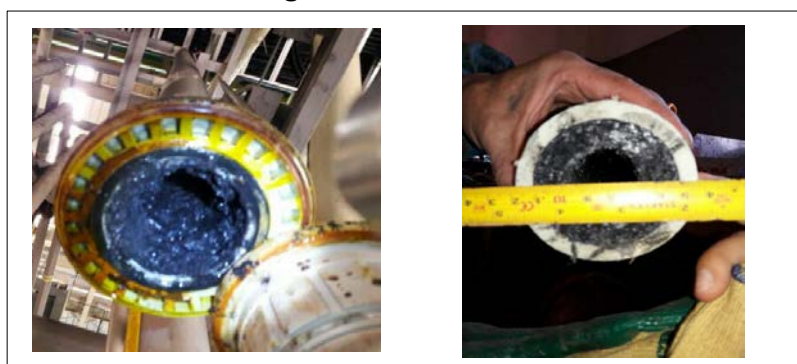
► Comparison of before and after cleaning



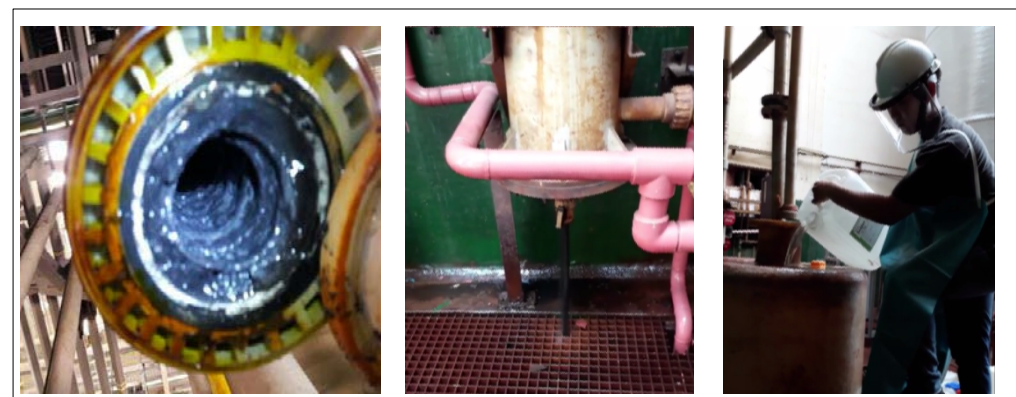
Type		Capacity	-
Equipment	PIPE	Requirement	-
Applied Company	CHINA STEEL	Temperature	60°C
Chemical		Processing Time	8 hours
Dilution Rate	30%	Cleaning Method	Circulation

※ operation date : June. 2017

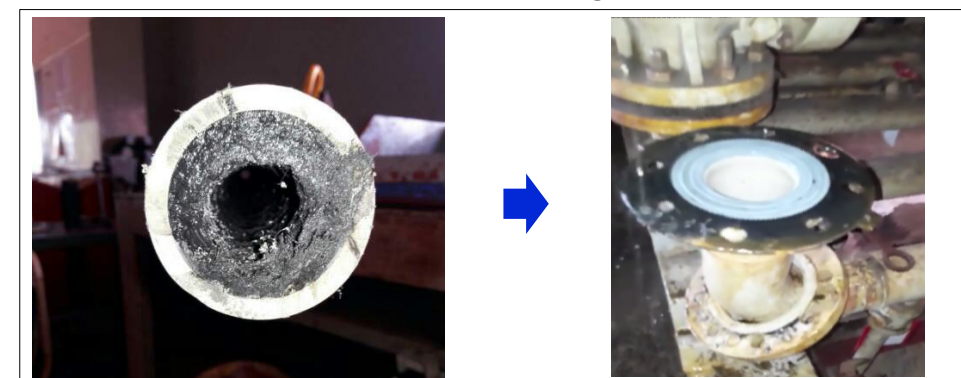
► Chemical cleaning



► Chemical circulation cleaning



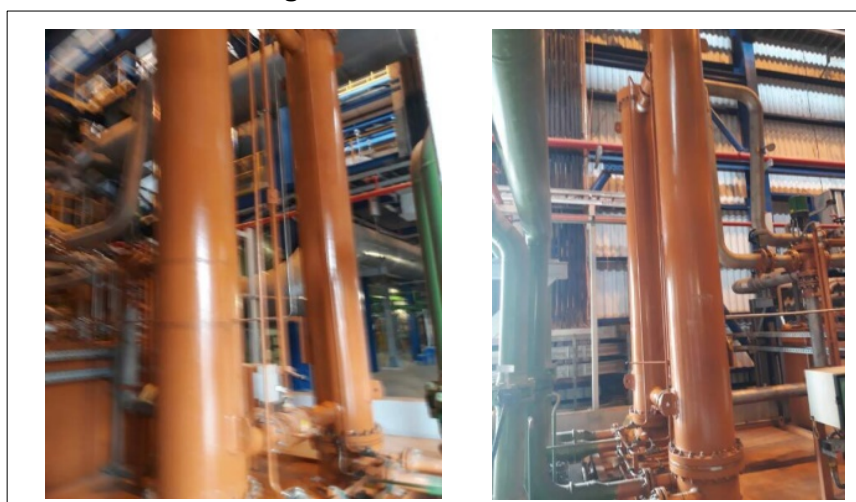
► Comparison of before and after cleaning



Type		Capacity	-
Equipment	PLATE HEAT EXCHANGER	Requirement	-
Applied Company	CA MAU POWER PLANT	Temperature	50°C
Chemical	KSR - 1000	Processing Time	4 hours
Dilution Rate	25%	Cleaning Method	Circulation

※ operation date : June. 2017

► Chemical cleaning



► Chemical spray cleaning



Type	3 SET	Capacity	-
Equipment	HYDRAULIC JACK	Requirement	-
Applied Company	CAM PHA CEMENT	Temperature	50°C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	25%	Cleaning Method	Circulation

※ operation date : June. 2017

► Chemical cleaning



► Chemical circulation cleaning



► Chemical circulation cleaning



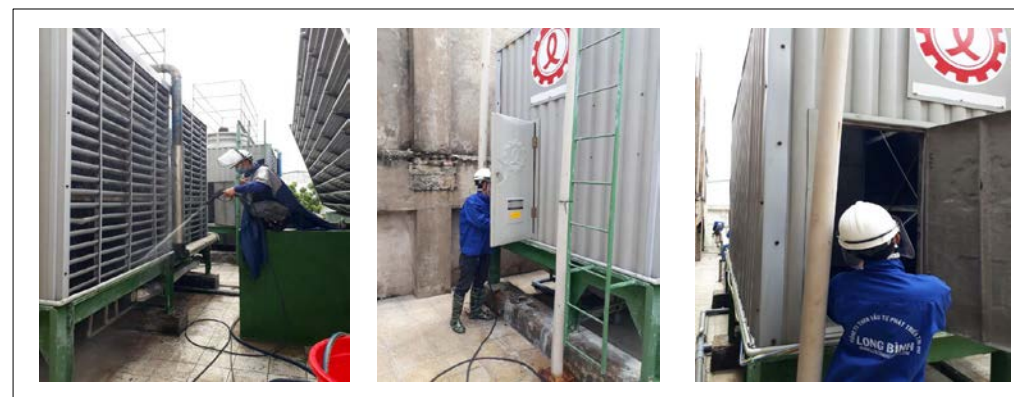
Type		Capacity	-
Equipment	COOLING TOWER	Requirement	-
Applied Company	FORMOSA TAFFETA LONG AN	Temperature	60°C
Chemical	ST-407	Processing Time	8 hours
Dilution Rate	30%	Cleaning Method	Spray and Circulation

※ operation date : June. 2017

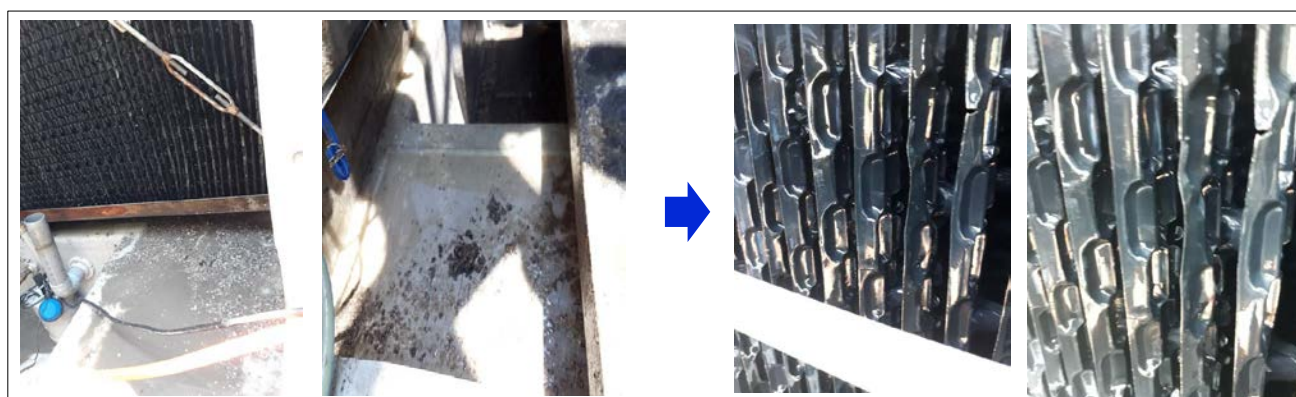
► Chemical cleaning



► Chemical spray cleaning



► Before and After



Type	3 SET	Capacity	-
Equipment	FJC GAS COOLER	Requirement	-
Applied Company	China Steel	Temperature	50°C
Chemical	ST – 302R	Processing Time	4 hours
Dilution Rate		Cleaning Method	Chemical circulation

※ operation date : July. 2017

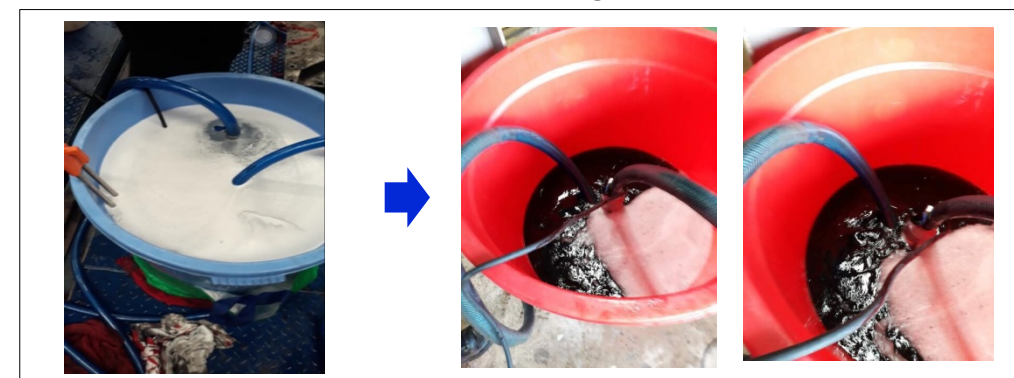
► Chemical cleaning



► Chemical circulation cleaning



► Comparison of before and after cleaning



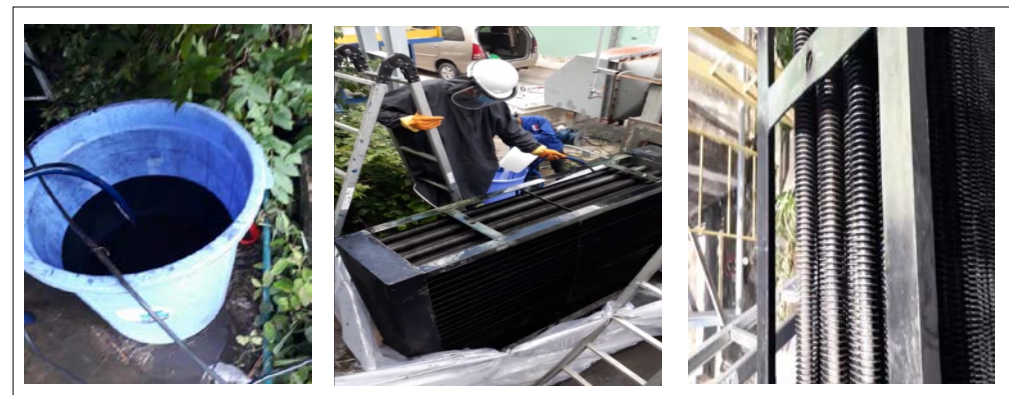
Type		Capacity	-
Equipment	Heat Exchanger (outside)	Requirement	-
Applied Company	CHINA STEEL	Temperature	40°C
Chemical	KSR - 1000	Processing Time	4+ hours
Dilution Rate		Cleaning Method	Circulation and Spray

※ operation date : Aug. 2017

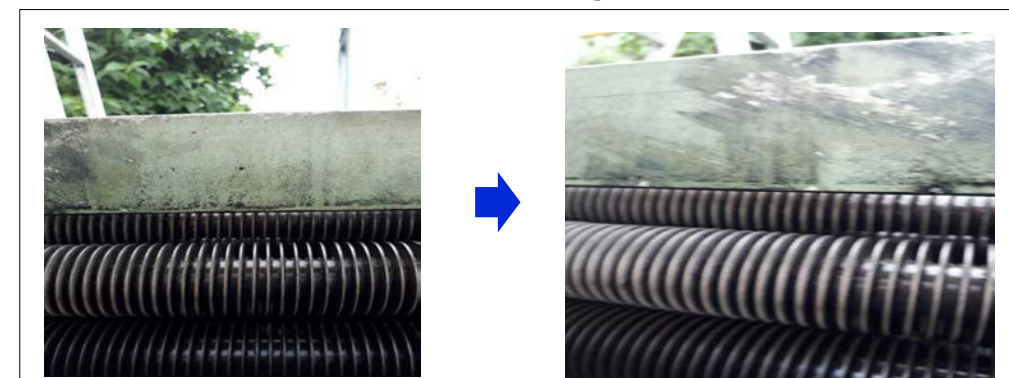
► Chemical cleaning



► Chemical spray cleaning



► Comparison of before and after cleaning



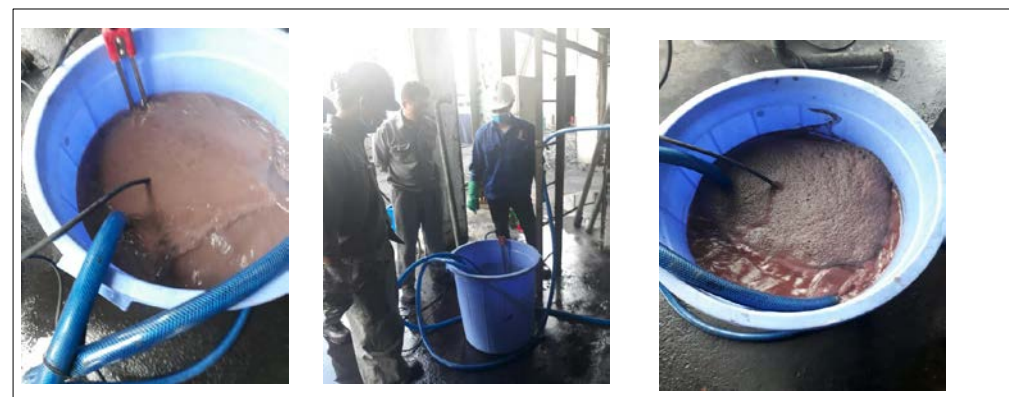
Type		Capacity	-
Equipment	Heat Exchanger	Requirement	-
Applied Company	POMINA STEEL	Temperature	40°C
Chemical	KSR - 1000	Processing Time	5 hours
Dilution Rate		Cleaning Method	Circulation

※ operation date : Sept. 2017

► Chemical cleaning



► Chemical circulation cleaning



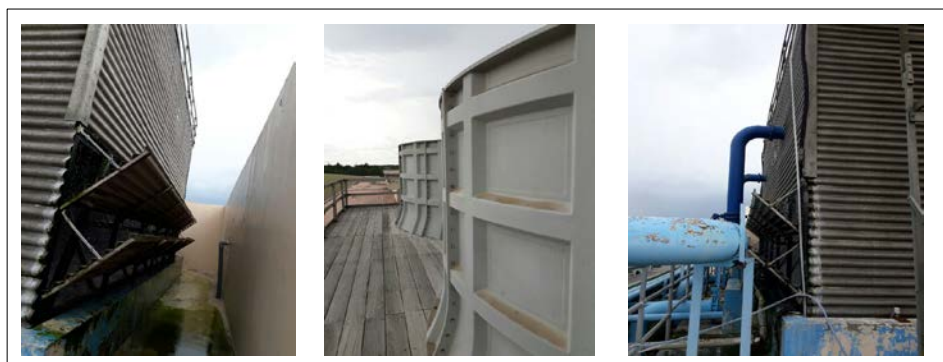
► Before and After



Type		Capacity	-
Equipment	Cooling Tower	Requirement	-
Applied Company	FORMOSA DONG NAI	Temperature	60 °C
Chemical	ST - 407	Processing Time	5 hours
Dilution Rate	20%	Cleaning Method	Spraying

※ operation date : Sep. 2017

► Chemical cleaning



► Chemical cleaning



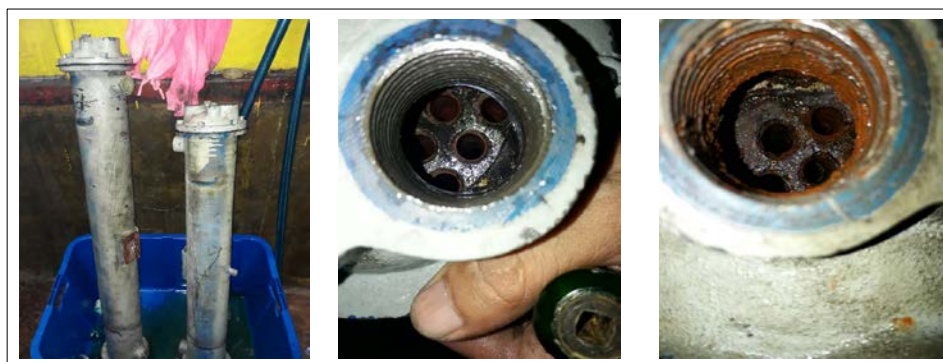
► Chemical cleaning



Type		Capacity	-
Equipment	Pipe	Requirement	-
Applied Company	CHINA STEEL	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	8 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : Sept. 2017

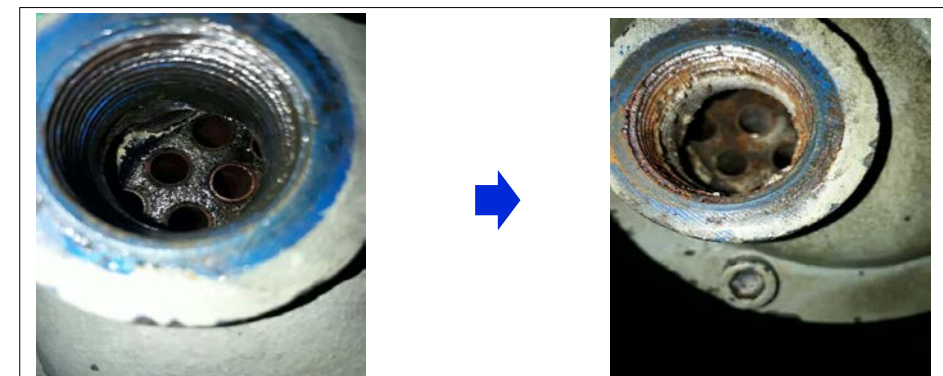
► Chemical cleaning



► Chemical cleaning



► Comparison of before and after cleaning



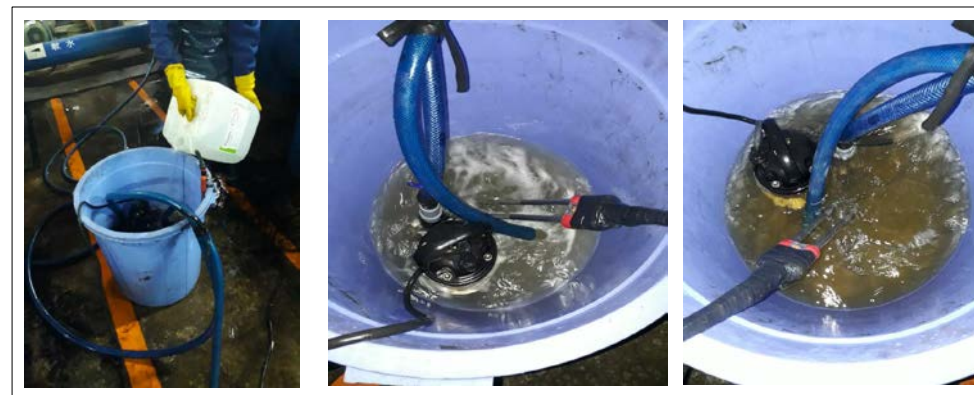
Type	SHELL SIDE & TUBE SIDE	Capacity	-
Equipment	SHELL TUBE TYPE HEAT EXCHANGER	Requirement	-
Applied Company	FORMOSA DONG NAI	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : Oct. 2017

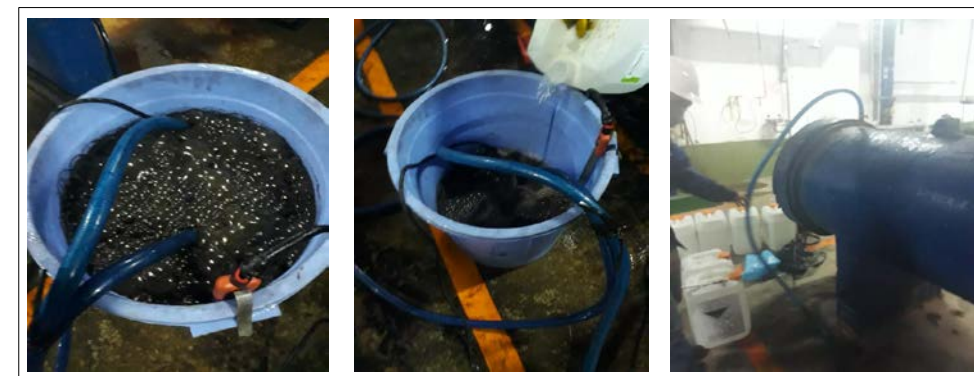
► Equipment cleaning



► Chemical circulation cleaning



► Chemical circulation cleaning



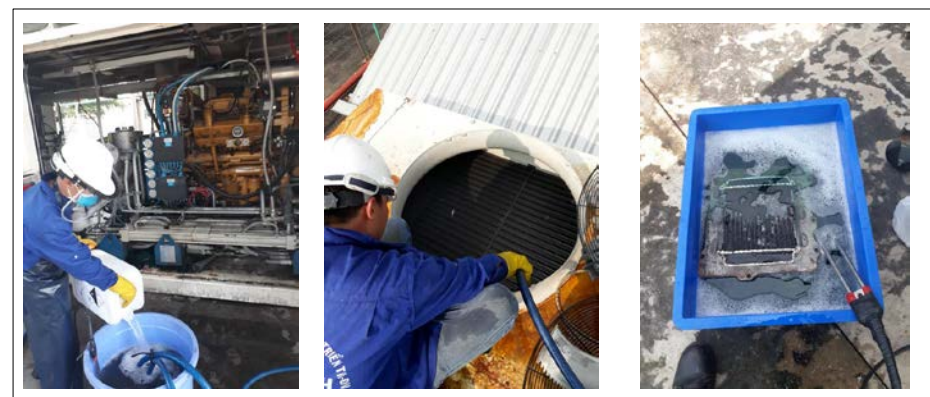
Type		Capacity	-
Equipment		Requirement	-
Applied Company	PV GAS SOUTH DONG NAI	Temperature	60 °C
Chemical	ST - 302R	Processing Time	8 hours
Dilution Rate	20%	Cleaning Method	Circulation & Deposition

※ operation date : Oct. 2017

► Equipment cleaning



► Chemical circulation & Deposition cleaning



► Chemical cleaning



Type		Capacity	-
Equipment	Boiler & Pipe	Requirement	-
Applied Company	DONG PHUONG PETROLEUM	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : Oct. 2017

► Equipment cleaning



► Chemical circulation cleaning



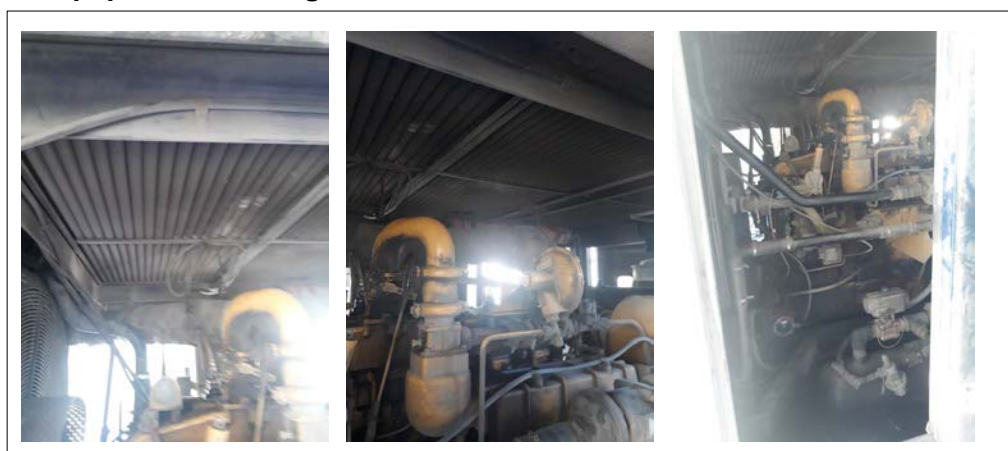
► Chemical circulation cleaning



Type		Capacity	-
Equipment	Air Fin Cooler	Requirement	-
Applied Company	PV GAS DONG NAI	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation / Spraying

※ operation date : NOV. 2017

► Equipment cleaning



► Chemical circulation / spraying cleaning



Type		Capacity	-
Equipment	Air Fan Cooler	Requirement	-
Applied Company	PV GAS DONG NAI	Temperature	60 °C
Chemical	ST - 302R	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Spraying / Circulation

※ operation date : NOV. 2017

► Equipment cleaning



► Chemical spraying cleaning



► Chemical spraying cleaning



Type		Capacity	-
Equipment	COOLER	Requirement	-
Applied Company	POSCO STAINLESS FACTORY	Temperature	60 °C
Chemical	KSR -1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : NOV. 2017

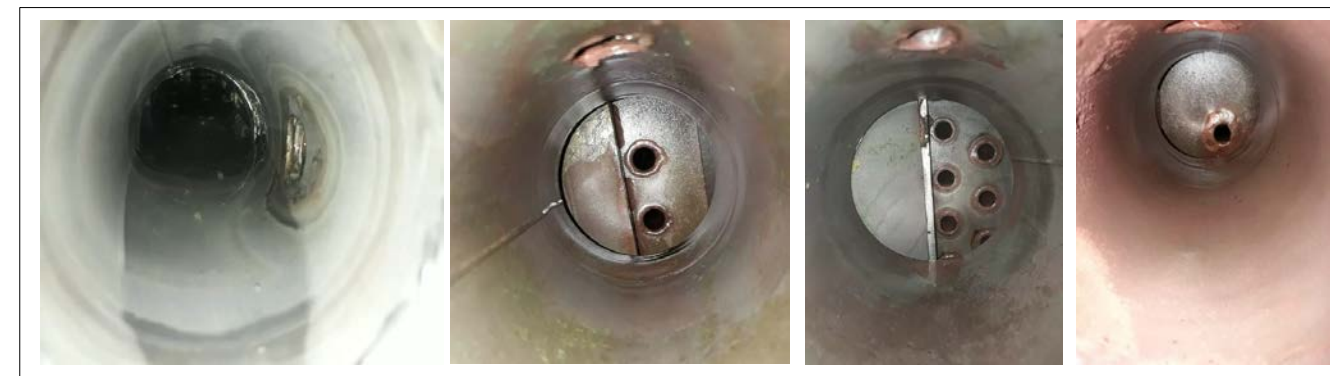
► Equipment cleaning



► Chemical circulation cleaning



► Chemical circulation cleaning



Type		Capacity	-
Equipment	COOLER	Requirement	-
Applied Company	POSCO STAINLESS FACTORY	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : NOV. 2017

► Equipment cleaning BEFORE



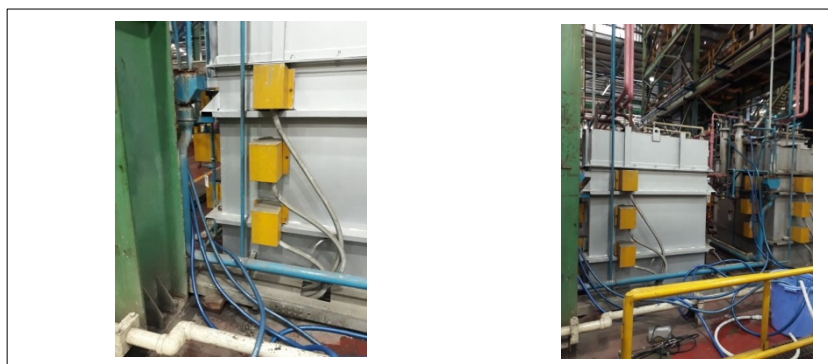
► Chemical circulation cleaning



Type		Capacity	-
Equipment	COOLER	Requirement	-
Applied Company	POSCO STAINLESS FACTORY	Temperature	60 °C
Chemical	KSR - 1000	Processing Time	6 hours
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : NOV. 2017

► Equipment cleaning



► Chemical circulation cleaning



► Chemical circulation cleaning



Type	Oil Scale Sample	Capacity	-
Equipment		Requirement	-
Applied Company	PETRO VIETNAM OIL	Temperature	60 °C
Chemical	ST-102	Processing Time	1 hour
Dilution Rate	20%	Cleaning Method	

※ operation date : Dec. 2016

► Chemical cleaning



► Comparison of before and after cleaning





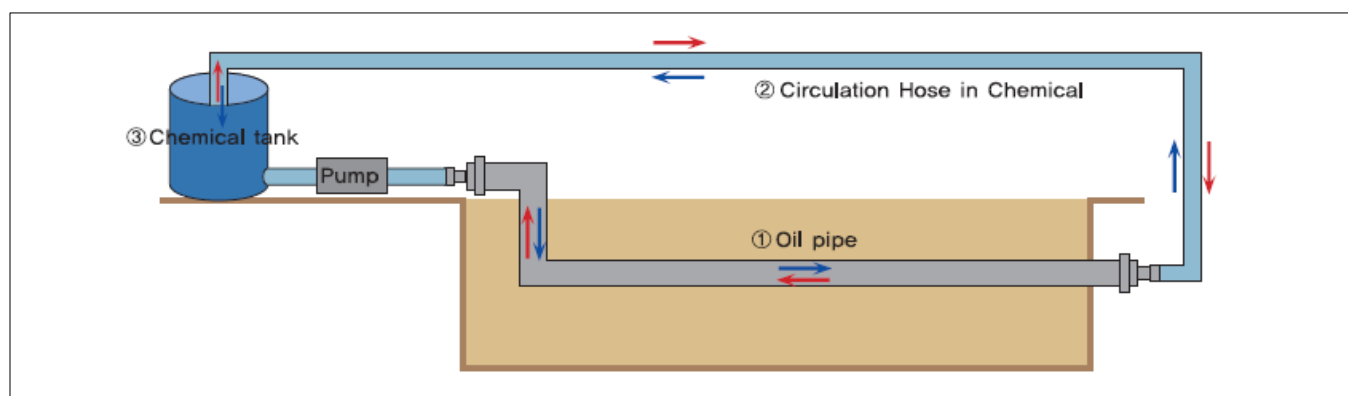
INTERNATIONAL



Type	Tube	Capacity	706kg (4inch, 35m pipe)
Equipment	Oil Pipeline	Requirement	120kg
Applied Company	Indonesia / Pertamina	Temperature	50°C
Chemical	ST-407	Processing Time	-
Dilution Rate	17%	Cleaning Method	Circulation & Deposition

※ operation date : Nov. 2011

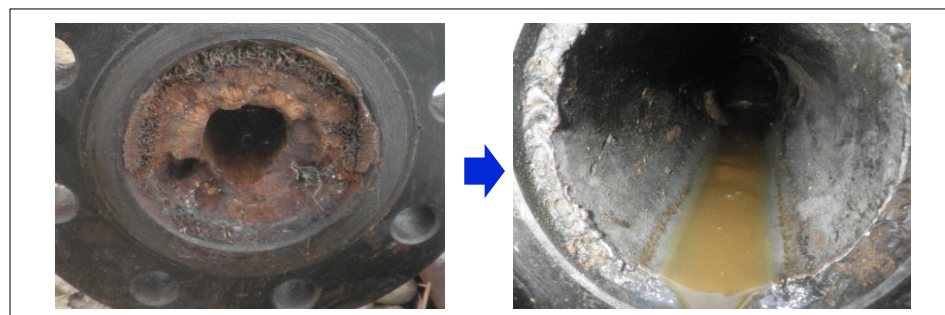
► Chemical Circulation



► Chemical circulation cleaning



► Comparison of before and after cleaning



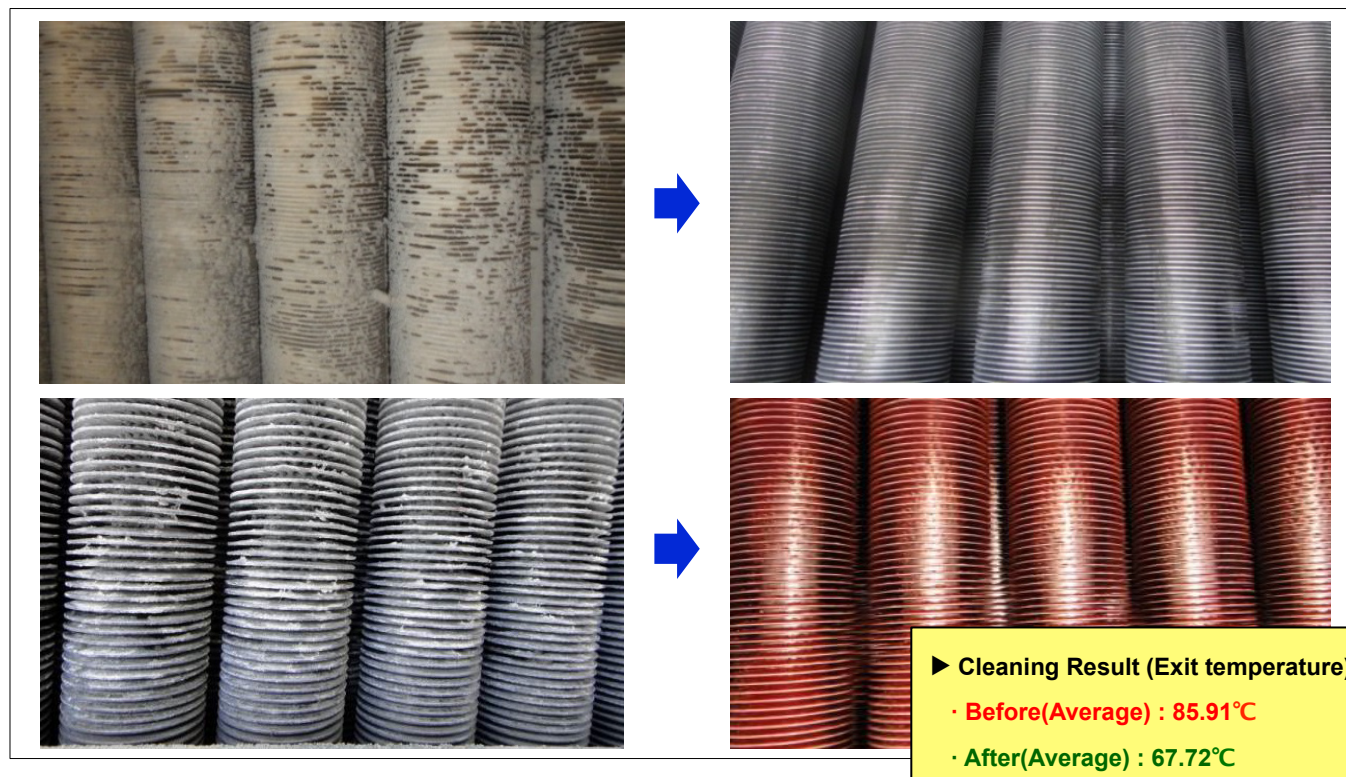
Type	Fin-tube	Capacity	(7m x 4m x 5 layer)
Equipment	AFC (Air Fin Fan Cooler)	Requirement	340kg
Applied Company	Singapore / Exxon Mobil	Temperature	40°C
Chemical	ST-302R	Processing Time	-
Dilution Rate	30%	Cleaning Method	Spray

※ operation date : Dec. 2012

► Equipment overview



► Comparison of before and after cleaning



Type	Fin-tube	Capacity	(4m x 12m x 8 layer)
Equipment	AFC (Air Fin Fan Cooler)	Requirement	500kg
Applied Company	Korea / Hyundai Oil Bank	Temperature	60°C
Chemical	ST-302R	Processing Time	-
Dilution Rate	25%	Cleaning Method	Spray

※ operation date : May. 2012

► Overview of AFC Cleaning work



Cleaning target AFC

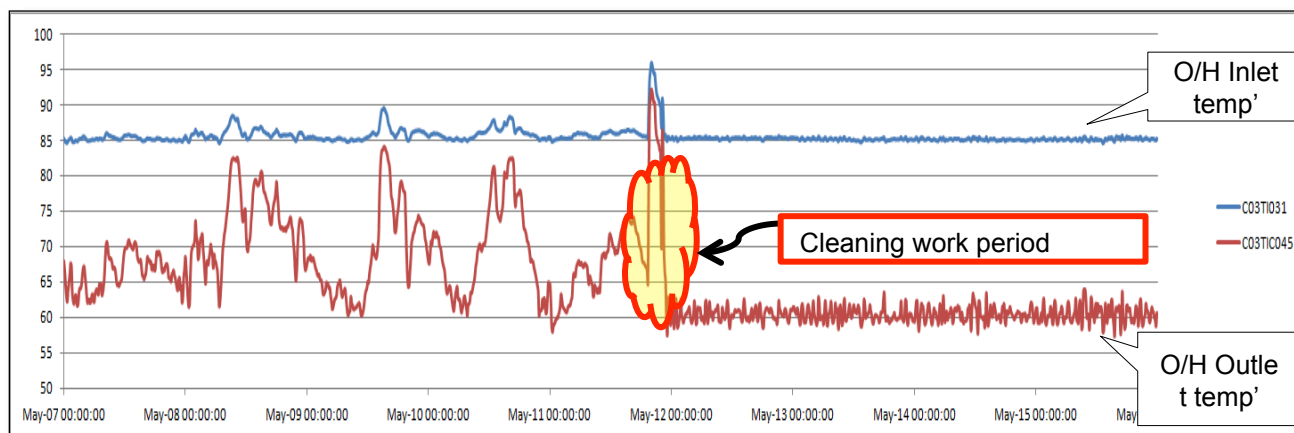


Cleaning work view



Chemical collecting

► Cleaning Result (IN / OUT Temperature changes in AFC)



Type	Fin-tube	Capacity	(5m x 12m x 12 layer)
Equipment	AFC (Air Fin Fan Cooler)	Requirement	120kg
Applied Company	Indonesia / Listrindo	Temperature	40°C
Chemical	ST-302R	Processing Time	-
Dilution Rate	30%	Cleaning Method	Spray

※ operation date : 27-28. Jul. 2012



► Before and After Cleaning



Type	Tube	Capacity	67kg
Equipment	Oil Heater	Requirement	20kg
Applied Company	Singapore / Exxon Mobil	Temperature	40°C
Chemical	ST-302R	Processing Time	2hr
Dilution Rate	30%	Cleaning Method	Deposition & High Pressure Washin g

※ operation date : 20. Sep. 2012

- ▶ Taken heater coil complete of Lub oil purifier heater for G/E



- ▶ Prewashing of hard sludge by gas oil and high Press. Air jet.



- ▶ Mixed the recommended dosage rate of chemical and fresh water



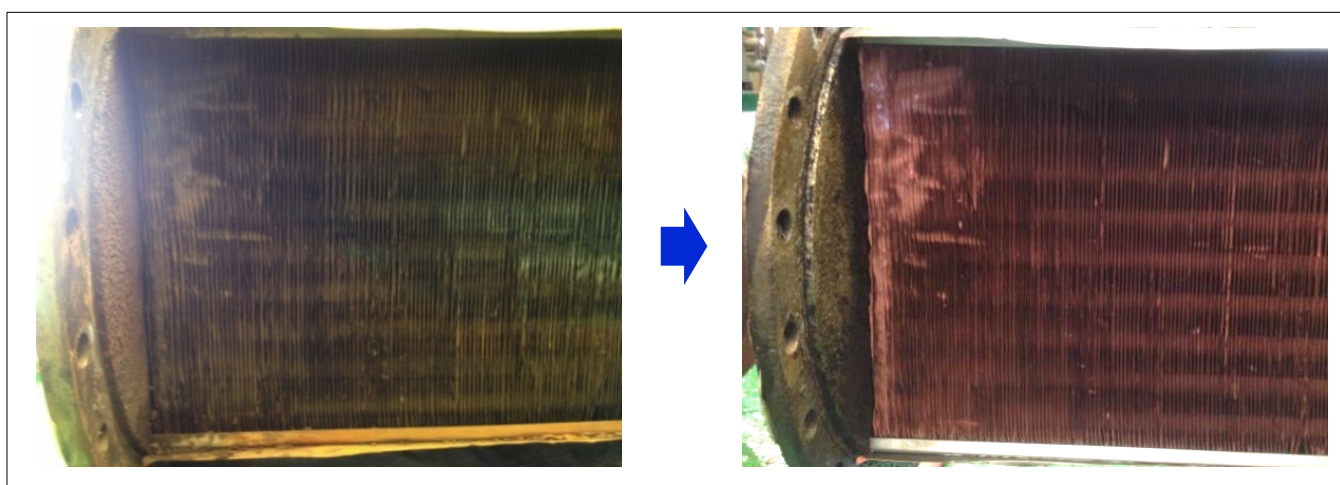
Type	Fin	Capacity	3,600kg
Equipment	Air Preheater	Requirement	360kg
Applied Company	Korea / LG Chemical	Temperature	40°C
Chemical	ST-407	Processing Time	4hr
Dilution Rate	10%	Cleaning Method	Deposition & High Pressure Washing

※ operation date : 15-16. Jul. 2013

► Equipment overview & Chemical cleaning work



► Comparison of before and after cleaning



Type	Shell & Tube	Capacity	shell side : 15ton tube side : 15ton
Equipment	CCW (Cross Cooling Water Exchanger)	Requirement	2,250kg
Applied Company	Korea / Boryeong Thermal Power Plant	Temperature	40°C
Chemical	ST-407	Processing Time	24hr
Dilution Rate	7.5%	Cleaning Method	Circulation & Deposition

※ operation date : 20. Apr. 2012



Cleaning target

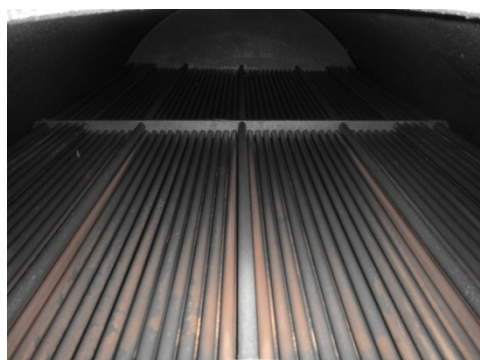


Cleaning circulation bath

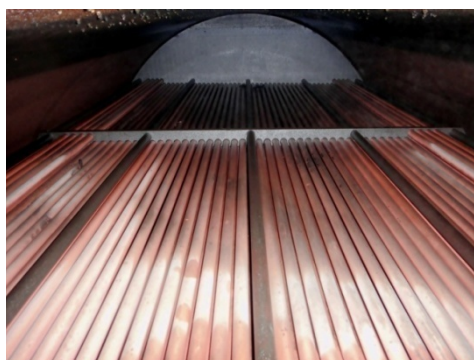


Chemical circulation

► Comparison of before and after cleaning (Shell side)



Film Scale formed in the outer wall of Tube Bundle before cleaning



Film Scale after cleaning

► Comparison of before and after cleaning (tube side)



Tube Channel before cleaning



Tube Side after cleaning

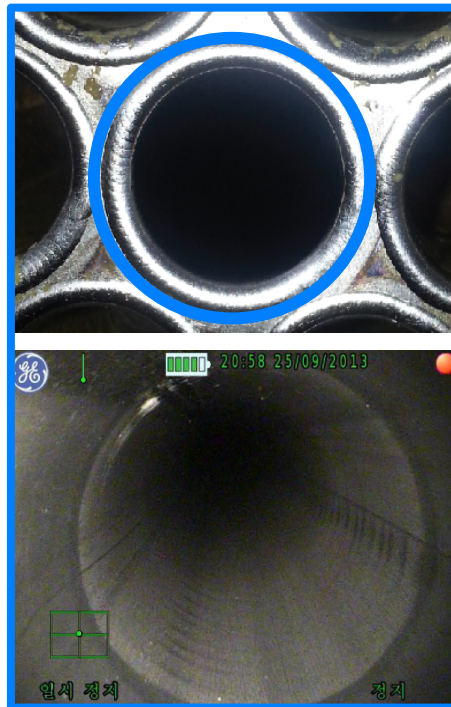
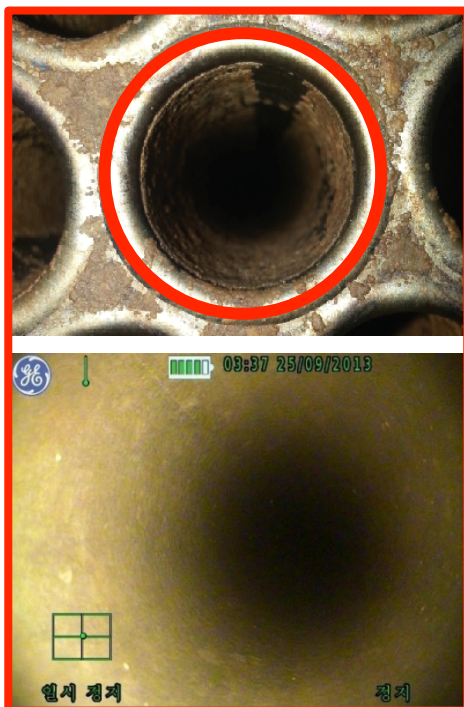
Type	Shell & Tube	Capacity	98,960kg
Equipment	Condenser	Requirement	4,675kg
Applied Company	Korea / South Jeju Thermal Power Plant	Temperature	40°C
Chemical	ST-407	Processing Time	4day
Dilution Rate	12%	Cleaning Method	Circulation & Deposition

※ operation date : 25. Sep. 2013

► Cleaning Target



► Shape of inside Tube before and after cleaning



Type	-	Capacity	(20m x 2m x 3m)
Equipment	Cooling Tower	Requirement	80kg
Applied Company	Indonesia / UOB Building	Temperature	40°C
Chemical	ST-407	Processing Time	4~8hr
Dilution Rate	15%	Cleaning Method	Spray

※ operation date : Apr. 2013

► Cooling Tower Filler Cleaning

Before



After



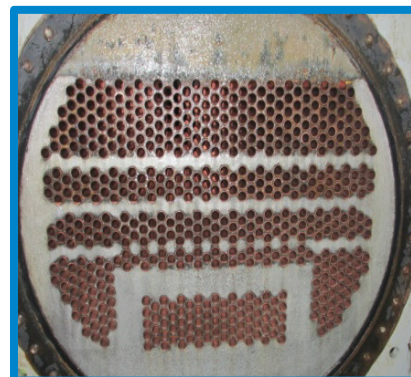
Type	Shell & Tube	Capacity	(20m x 2m x 3m)
Equipment	Chiller	Requirement	1st: 80kg 2nd: 80kg
Applied Company	Indonesia / UOB Building	Temperature	40°C
Chemical	1st: ST-407 2nd: MSR-100	Processing Time	16hr
Dilution Rate	1st : 15% 2nd : 15%	Cleaning Method	Circulation & Deposition

※ operation date : Apr. 2013

► Chiller Filler Cleaning



Before



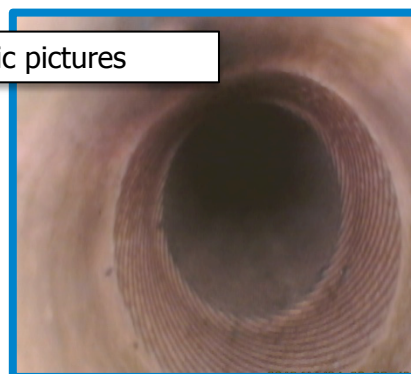
After

► Cleaning Result

- 3 units of Chillers operated before cleaning
- 2 units of Chillers operated after cleaning
- 33% of electric rates reduced



Endoscopic pictures



Type	Tube	Capacity	120kg
Equipment	Grinder Cutting Oil Pipe	Requirement	60kg
Applied Company	Korea / POSCO Kwangyang Iron	Temperature	60°C
Chemical	ST-302R	Processing Time	6hr
Dilution Rate	50%	Cleaning Method	Circulation & Deposition

※ operation date : Dec. 2013

► Cleaning Target Facility and Chemical Circulation Cleaning Work



Hot Rolling Mill Roll Shop Grinder Facility



Chemical Circulation Cleaning Work

► Shape of inside Pipe Before and After Cleaning



Type	Shell & Tube	Capacity	534kg
Equipment	Air Compressor	Requirement	80kg
Applied Company	Korea / Iljin Global	Temperature	40°C
Chemical	ST-407	Processing Time	4hr
Dilution Rate	15%	Cleaning Method	Circulation & Deposition

※ operation date : Dec. 2013

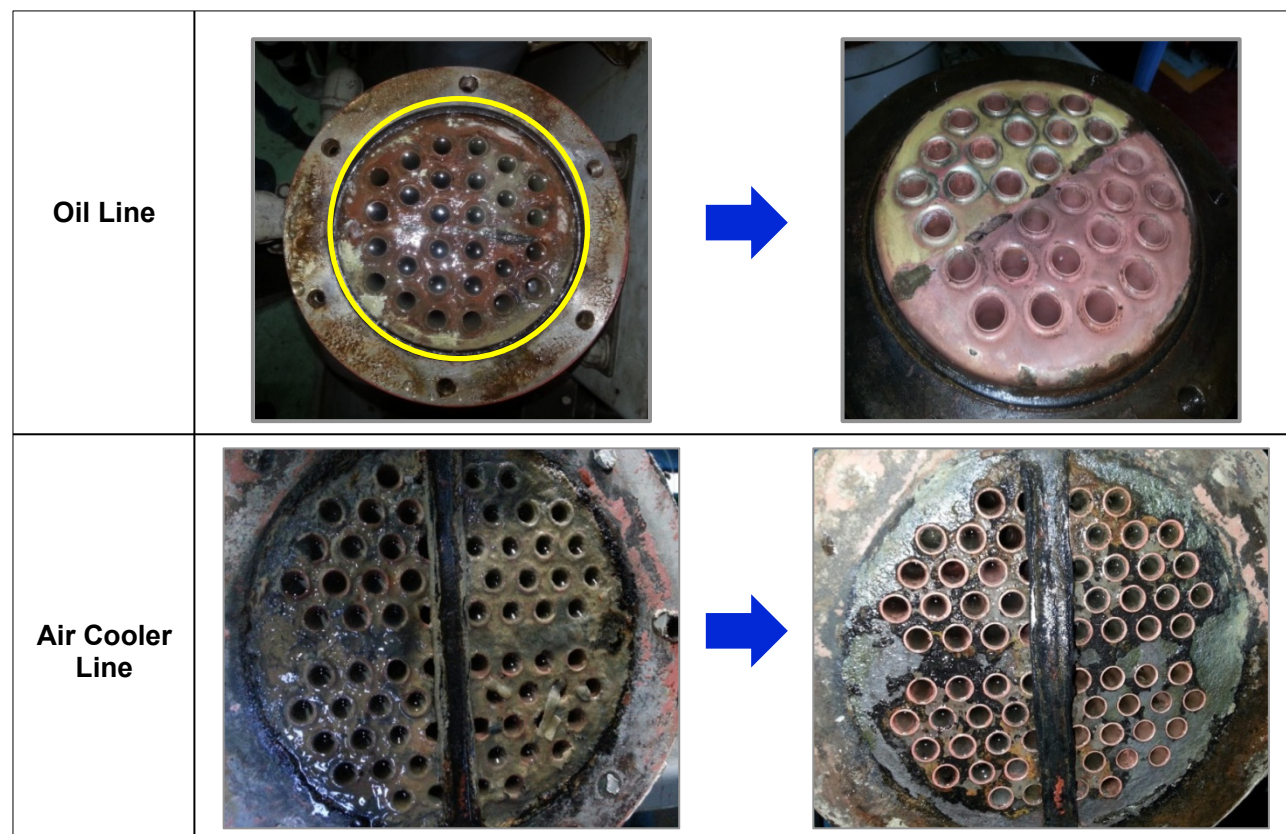
► Cleaning Target Facility



► Cleaning Result (Check Exit Temperature Before and After Cleaning)

- Average Temp. Before Cleaning: 98°C
- Average Temp. After Cleaning : 87°C

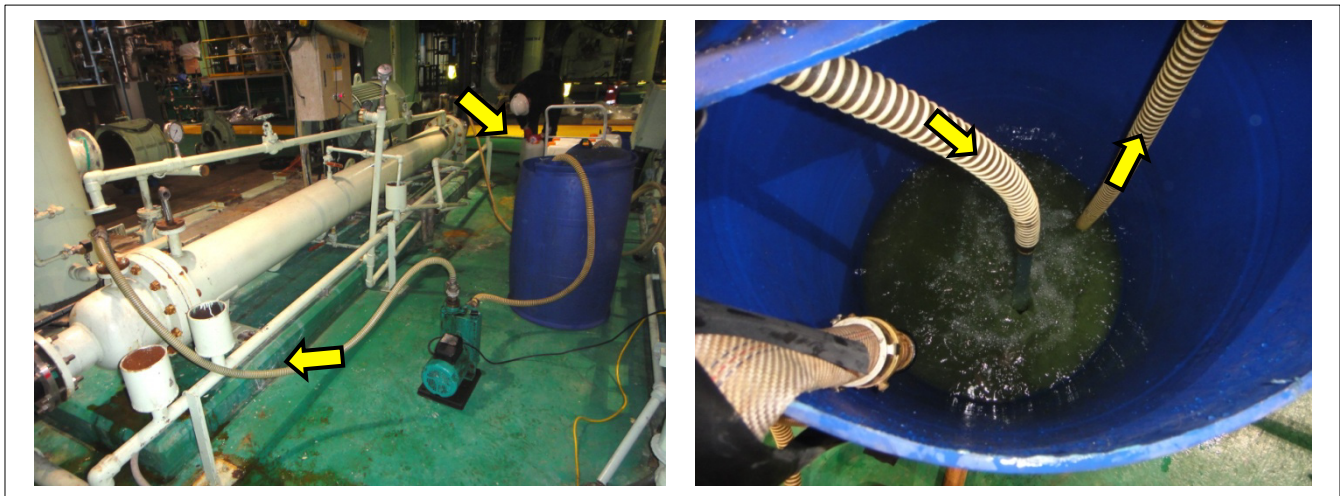
► Before and After Cleaning



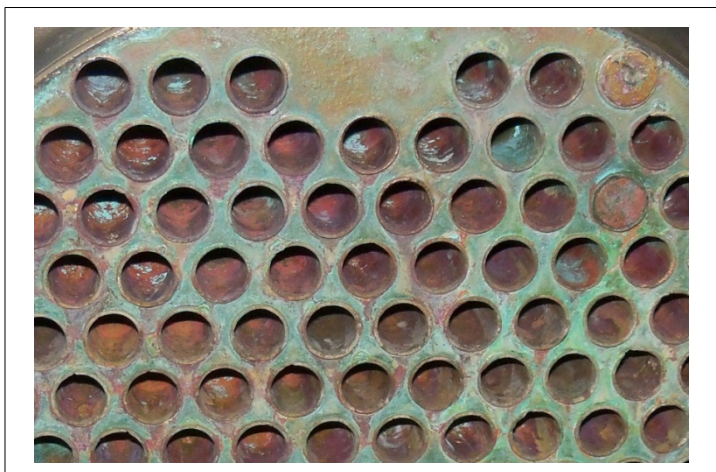
Type	Shell & Tube	Capacity	500kg
Equipment	CVP Shell & Tube	Requirement	100kg
Applied Company	Korea / Taeahn Thermal Power Plant	Temperature	25°C
Chemical	MSR-100	Processing Time	4hr
Dilution Rate	20%	Cleaning Method	Circulation

※ operation date : Apr. 2011

► Cleaning Target Facility and Chemical Circulation Cleaning Work



► Shape of Tube side(Seawater side) after cleaning



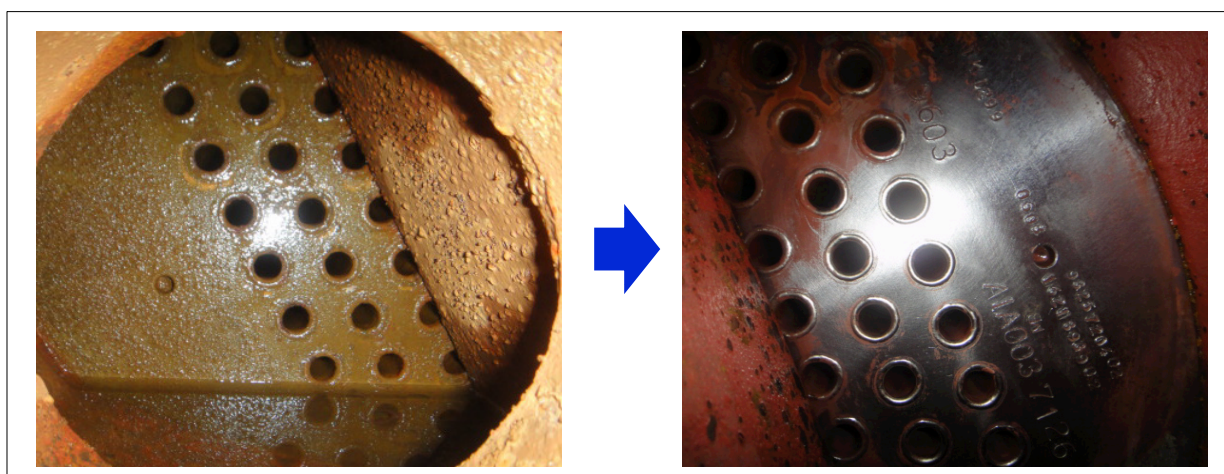
Type	Shell & Tube	Capacity	100kg
Equipment	Compressor Inter Cooler	Requirement	50kg
Applied Company	Korea / Korea Zinc	Temperature	50°C
Chemical	ST-302R	Processing Time	4~6hr
Dilution Rate	50%	Cleaning Method	Circulation

※ operation date : 25. May. 2011

► Cleaning Target Facility and Chemical Circulation Cleaning Work



► Shape of Cooler Inlet Before and After Cleaning



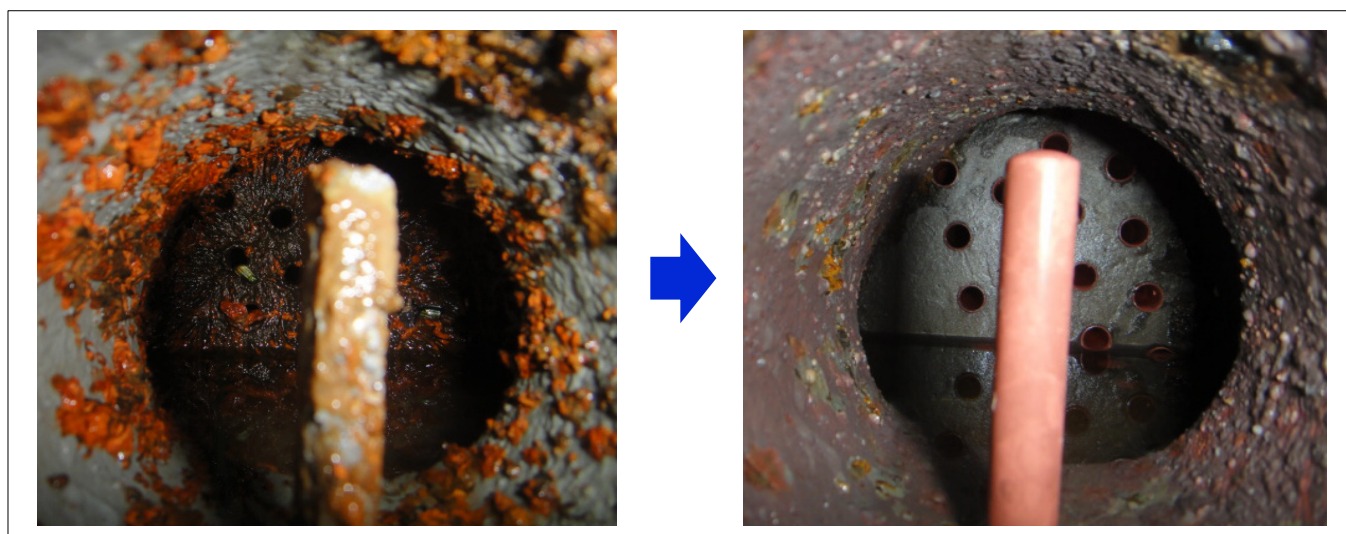
Type	Shell & Tube	Capacity	100kg
Equipment	Compressor Inter Cooler	Requirement	50kg
Applied Company	Korea / Daesang	Temperature	40°C
Chemical	ST-302R	Processing Time	5hr
Dilution Rate	50%	Cleaning Method	Circulation

※ operation date : Jul. 2011

► Cleaning Target Facility and Chemical Circulation Cleaning Work



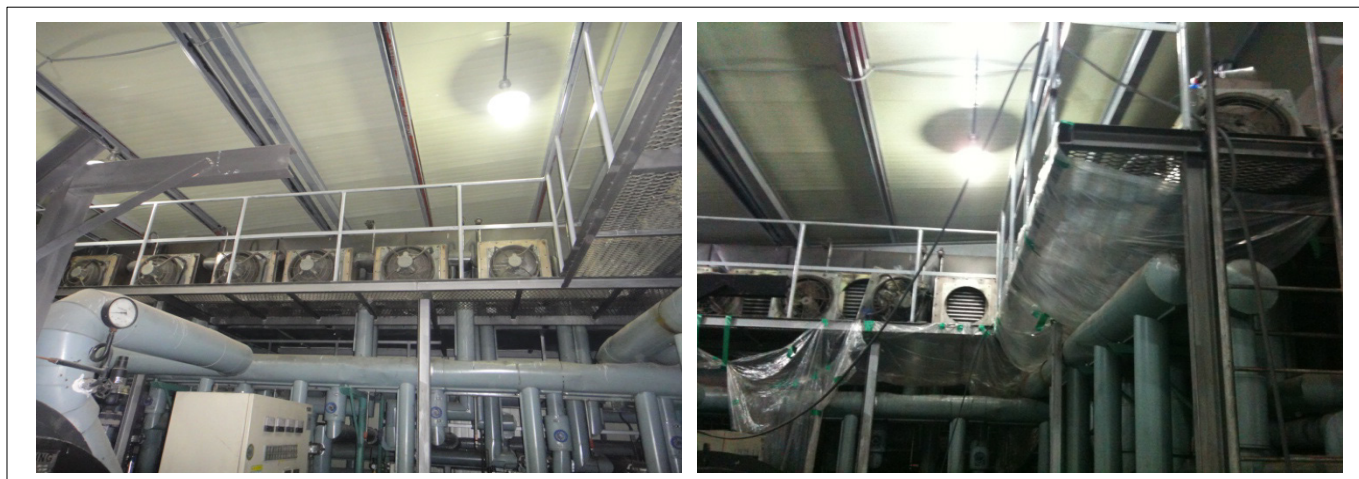
► Shape of Cooler Inlet Before and After Cleaning



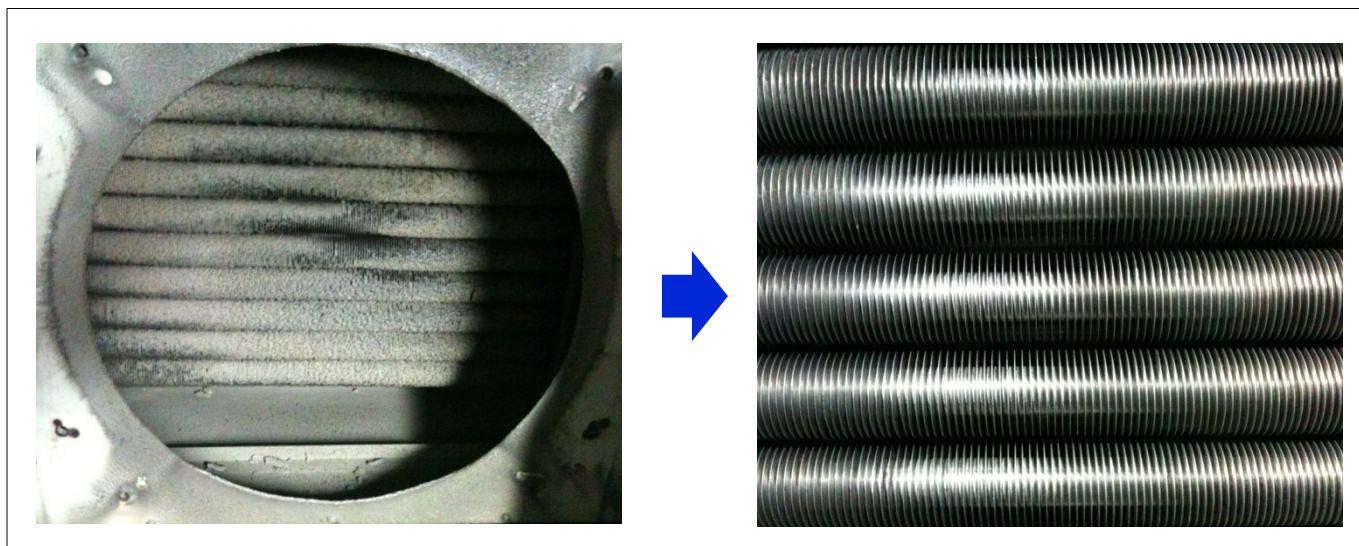
Type	Shell & Tube	Capacity	400kg
Equipment	Boiler Fan Cooler	Requirement	200kg
Applied Company	Korea / Kumkang Marine	Temperature	40°C
Chemical	ST-302R	Processing Time	4~8hr
Dilution Rate	50%	Cleaning Method	Spray

※ operation date : 3-4. Aug. 2011

► Cleaning Target Facility



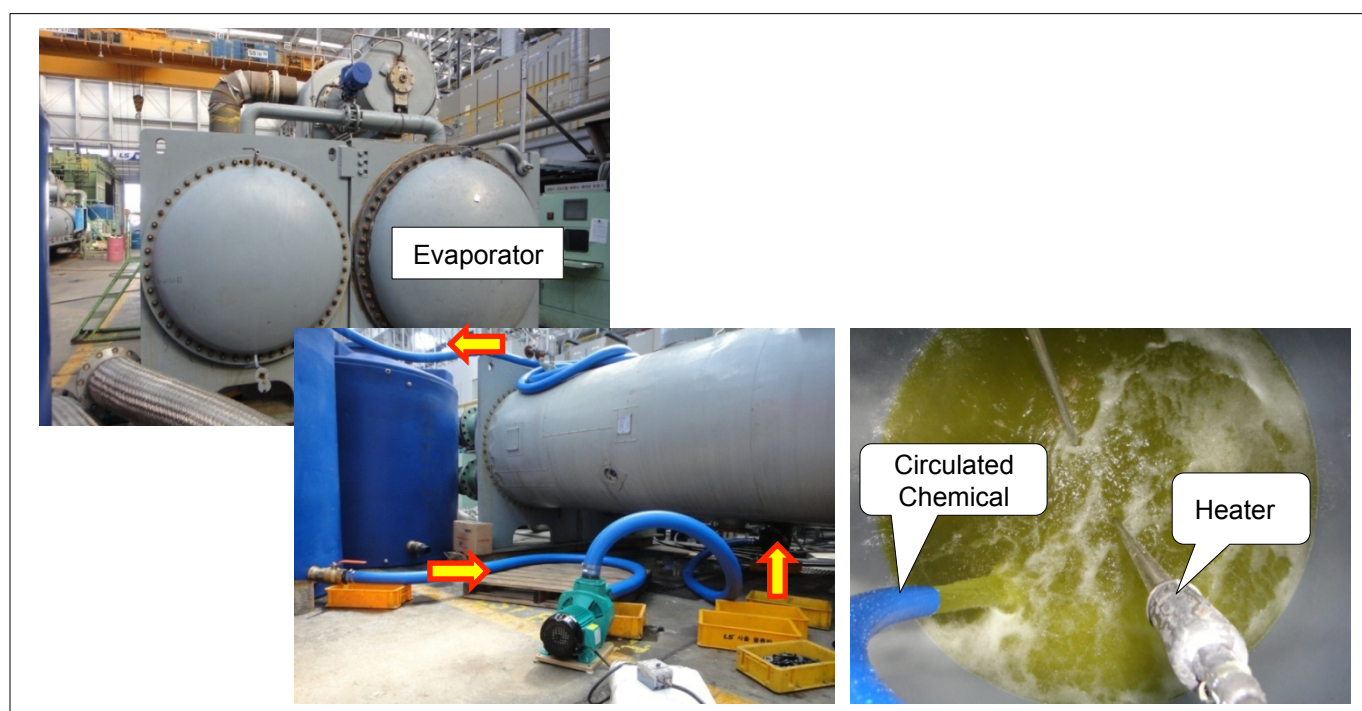
► Before and After Cleaning



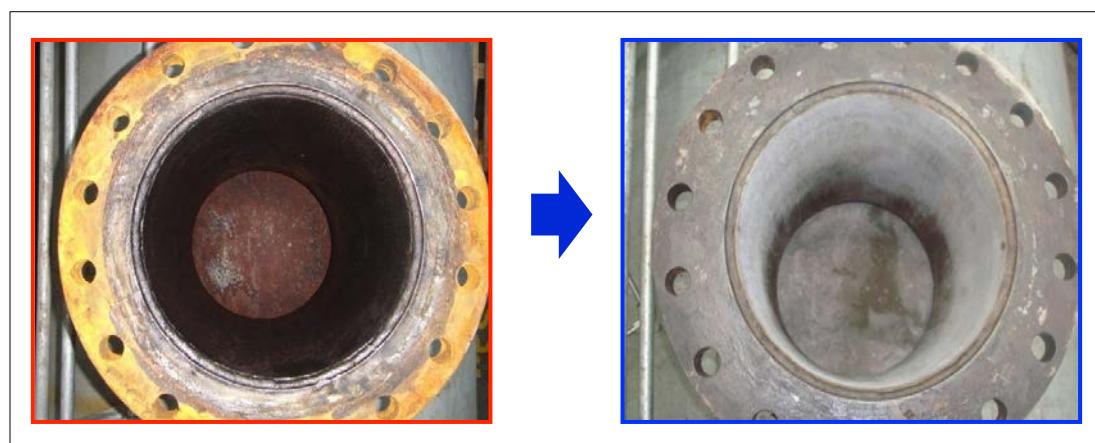
Type	-	Capacity	10,500kg
Equipment	Refrigerator Set	Requirement	4,500kg
Applied Company	Korea / LS Mtron	Temperature	50°C
Chemical	ST-302R	Processing Time	6hr
Dilution Rate	30%	Cleaning Method	Circulation & Deposition

※ operation date : Oct. 2010

► Cleaning Target Facility and Chemical Circulation Cleaning Work



► Inlet of Pipe Before and After Cleaning





Thank you for your attention

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