OSAKA BOILER

TECHNICAL INFORMATION

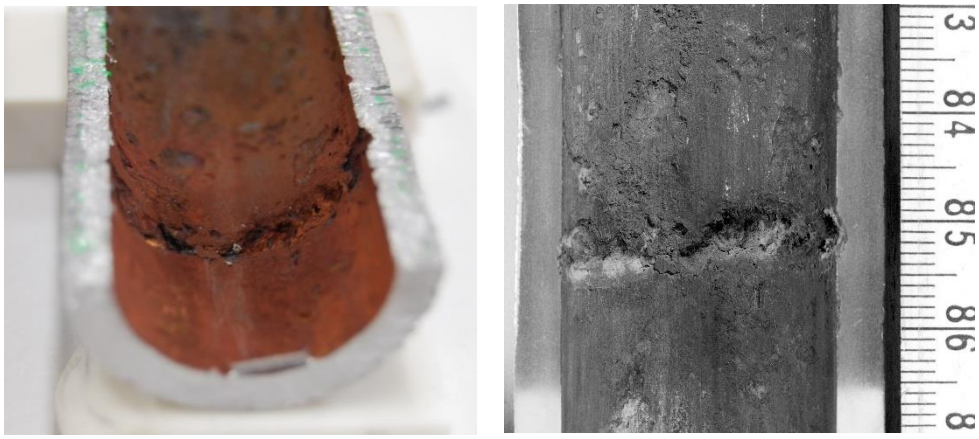
OSAKA BOILER MFG.CO.,LTD.

Water quality control of boiler

【Subject model: Auxiliary Boiler, Composite Boiler, Steam Separating Drum】

Boiler water treatment is very important in order to keep the good boiler condition.
Currently various boiler chemicals are offered commercially. But **never use boiler chemicals containing sodium sulfite**. The handling of sodium sulfite is very difficult. Mishandling of the sodium sulfite generates sulfate ion, leading corrosion like photos below.

Corrosion of lower tube plate caused by sulfate ion



Corrosion of feed water nozzle caused by sulfate ion

Table 1 and 2 show the boiler compound and oxygen scavenger which we are recommending. If other chemicals not described in table 1 and 2 are used, **be sure to confirm to chemical manufacturer that it contains no sodium sulfite**. And we recommend combination use of boiler compound and oxygen scavenger. Regarding oxygen scavenger, we recommend continuous dosing with metering pump.

Table 1: Boiler compound

Manufacturer	Description	Property	Remarks
KURITA WATER INDUSTRIES	KURIBORN 304	Liquid	
	KURIBORN WZ-406	Liquid	Non-phosphate type the boiler compound
ASHLAND (DREW)	AGK-100	Liquid	
	ADJUNCT-B GC	Powder Liquid	Use a combination of 2 kinds of chemical.
NIPPON YUKA KOGYO	YUNICON RS-5	Powder	
	YUNICON RS-40H	Powder	
WILHELMSEN	ALKALINITY CONTROL HARDNESS CONTROL	Liquid Powder	Use a combination of 2 kinds of chemical.
	ALKALINITY CONTROL HARDNESS TREATMENT	Liquid Liquid	Use a combination of 2 kinds of chemical.
	AUTOTREAT	Liquid	
	BWT LIQUID PLUS	Liquid	

Table 2: Oxygen scavenger

Manufacturer	Description	Property	Main ingredient
KURITA WATER INDUSTRIES LTD.	OXYNON A702	Liquid	N_2H_4
ASHLAND (DREW)	AMERZINE	Liquid	N_2H_4 (Hydrazine)
NIPPON YUKA KOGYO CO.,LTD.	YUNIZON-D	Liquid	N_2H_4
WILHELMSEN	OXYGEN CONTROL	Liquid	N_2H_4
	OXYGEN SCAVENGER 9-002	Liquid	N_2H_4
	OXYGEN SCAVENGER PLUS	Liquid	DEHA (Diethyl hydroxylamine)

Table 3 shows major control items and its purpose to execute boiler water control.

Table 3: Control item for boiler water and its purpose

Control item	Purpose
pH value	- Prevention of corrosion - Prevention of scale buildup by hardness and silica - Prevention of oil adhesion to heating surface
Chloride ion concentration	- Control of boiler water concentration level (indirect control for total vaporized residue) - Prevention of corrosion - Observation of seawater invasion - Prevention of carry-over
Phosphate ion concentration	- Prevention of scale buildup by hardness - pH control by phosphate treatment
Residual hydrazine (Residual DEHA in condensate)	- Prevention of corrosion by dissolved oxygen

Table 4 shows standard values for water quality control we define. **Regardless of the chemical being used, comply strictly with control items and control standard values shown in table 4. Regarding standard value of other control items except for table 4, comply with instruction of its pharmaceutical manufacturer.** Furthermore, dissolved oxygen in feed water becomes a factor of boiler corrosion, and the dissolved oxygen quantity is bound up with water temperature. Hence be careful so that feed water temperature does not fall below the design temperature, and record it in order to grasp the condition.

Table 4: Standard values of water quality control

Item		Unit	Makeup water	
			Raw water Softened water	Distilled water
Feed water	pH at 25℃	---	7.0 - 9.0	7.0 - 9.2
	Hardness	ppm mgCaCO$_3$/L	1 or less	---
	Salinity (Electrical conductivity)	---	---	Keep at low level (See *1)
	Oils and fats	ppm mg/L	Keep at low level (See *2)	
	Iron	ppm mgFe/L	0.3 or less (See *3)	
Boiler water	pH at 25℃	---	11.0 - 11.8	10.5 - 11.5
	Chloride ion concentration	ppm mgcL-/L	100 or less	50 or less
	Phosphate ion concentration (See *4)	ppm mgPO4^{3-}/L	20 - 100	20 - 40
	Residual hydrazine (Residual DEHA in condensate)	ppm mgN_2H_4/L (mg/L)	0.1 - 1.0 (0.12 - 0.30)	

*1: Continuous monitoring *2: Monitoring with observation tank or feed water filter tank
*3: Monitor when the boiler is unsteady condition
(example: newbuilding, boiler restart or etc)
*4: Measurement not required when using non-phosphate chemicals
Note: The above list is prepared based on JIME VOL 48 No.2 (2013) Table5.
However, "Residual DEHA in condensate" is compliant with EU standard.