

# OSAKA BOILER

## TECHNICAL INFORMATION

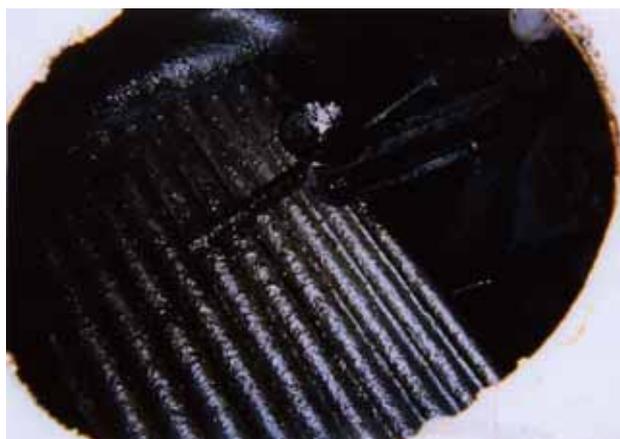
Osaka Boiler Mfg. Co., Ltd.

### Oil contamination in marine boiler

【Subject model: Aux. Boiler, Composite Boiler】

If oily matter get into boiler, it will adhere on the heating surface, causing overheat accident regardless of that quantity. Furthermore, boiler water is easily saponified because it is alkaline. Then it results in accident called CARRY-OVER caused by foaming of boiler water.

Pictures: Oil contamination into water side of boiler



Oily matter get into boiler from damaged heating coils of fuel oil heaters, lubricating oil heaters, fuel oil tanks or waste oil tanks. When oily matter is detected in boiler, it is important to specify the place where oil leaks, and repair it.

If the detection of oily matter is early enough or it is not yet carbonized, the following measures could help to solve the troubles.

1. Stop burner immediately if oily matter is detected in boiler, regardless of that quantity.
2. Discharge water from boiler and cascade tank completely, then wash their inside with fresh water thoroughly.
3. If no abnormality is checked in boiler and cascade tank by visual inspection, close manholes of boiler and inspection holes of cascade tank.
4. Feed water to boiler up to normal water level. Put appropriate boiler compound in, and inspect leakage under ambient temperature and atmospheric pressure. Check that

- boiler body, valves and others do not have any leak, then restart boiler operation.
- Normal pH value is controlled at 10.5-11.5 when using distilled water, but increase boiler compound quantity and maintain pH11.5-11.8. Operate 7 or 10 day periods until the water quality test shows good result. To discharge residual oil and saponified oil from boiler, perform surface blow-off and bottom blow-off once per day without fail, and double its quantity than the normal. Also sludge dispersant is recommended to use.

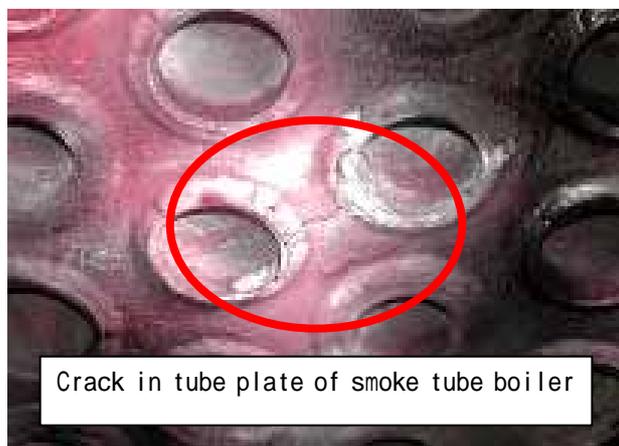
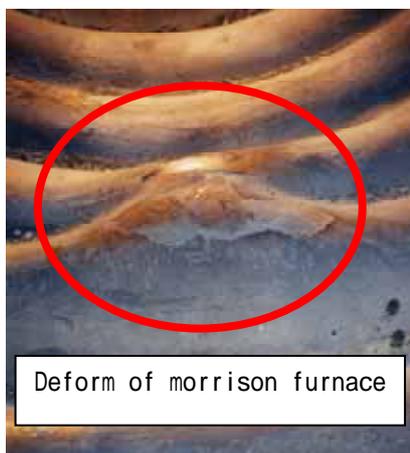
However, the above is measures when oily matter is detected relatively early or oily matter is not yet carbonized. Some troubles may not be solved by the above measures. In that case, remove carbonized oily matter by hand work as much as possible. Then, remove the remained oil in boiler by executing circulation cleaning with chemical. If remain untouched, boiler steel plate is overheated, causing serious accident such as deformation, collapse and crack. As an example, if oily matter get into boiler or scale adheres onto heating surface under the following condition, the average metal temperature rises significantly as shown in table 1.

Burning flue gas temperature	$t_g = 1,050 \text{ deg.C}$
Convection/Radiative heat-transfer coefficient in burning flue gas	$g = 130 \text{ W/m}^2.\text{K}$
Boiler water temperature	$t_w = 165 \text{ deg.C}$
Boiling heat-transfer coefficient in water side	$w = 9,300 \text{ W/m}^2.\text{K}$
Thickness of boiler steel plate	$= 22 \text{ mm}$
Thermal conductivity in boiler steel plate	$s = 46 \text{ W/m.K}$

Table 1. Comparison of average metal temperature

Fouling	Thermal conductivity in fouling(W/m.K)	Thickness of fouling(mm)	Average metal temperature of boiler steel plate (deg.C)
Clean condition	-	0	202
Scale	1	0.5	250
Oil	0.1	0.5	521

Pictures: Serious accident in boiler due to oil contamination



As shown in above pictures, even if oily matter into boiler water is small quantity, it leads to serious accident because boiler steel plate is overheated due to low thermal conductivity in oil.

So, regular observation is very important. And if oil contamination into boiler is detected, please take appropriate action immediately.