Vol.2

Service News

At this Vol. 2, we would like to reply you the following simple questions you may have.

Q1: What is the boiler efficiency?

A1:

Recently, saving energy may be one of your most interested themes, and then one of the most important subjects for boiler. Then, we will reply you the followings concerning Boiler Efficiency which is closely related with the boiler saving energy.

Definition of Boiler Efficiency is “The percentage of the total absorption heating value of outlet steam in the total supply heating value.”

In other word, it is a rate how the boiler runs efficiently. The actual calculation for the boiler efficiency is the followings;

$$\text{Boiler Efficiency} = \frac{\text{(Steam value per hour :kg)} \times (h_2 - h_1) \times 100}{\text{(Fuel consumption per hour :kg)} \times \text{(Fuel low calorific heating value : kJ/kg)}} \quad (\%)$$

h_2: The ratio enthalpy of feed water (kJ/kg)

h_1: The ratio enthalpy of steam (kJ/kg)

The initial value of boiler efficiency for Z Boiler is depending on the boiler type, but it is normally 80-88%. In short, 80-88% in the generated heating value after the fuel is burnt by the burner regenerates into the steam heating value, the remain of 12-20% is loss.

Generally, the main factor of the loss is the following.

1) Loss by fuel incomplete combustion (In case of heavy oil, the loss is a little.)
2) Loss by defective combustion gas
3) Loss by Exh. gas heat
4) Radiating loss from boiler surrounding wall
5) The other loss

We would like to explain 3) Loss by Exh. gas heat.

This is the max. loss in the boiler heat loss, moreover, the loss measuring is easy. Simply, if the Exh. gas temperature tends to rise, the loss will increase. We recommend you that you measure the temperature periodically and gain a tendency as compared with the trial test data.

Besides, can you suppose what is the cause of Exh. gas temperature increasing? Almost of the causes is the soot adhesion in the chamber caused year by year, and scale adhesion inside the water tube.

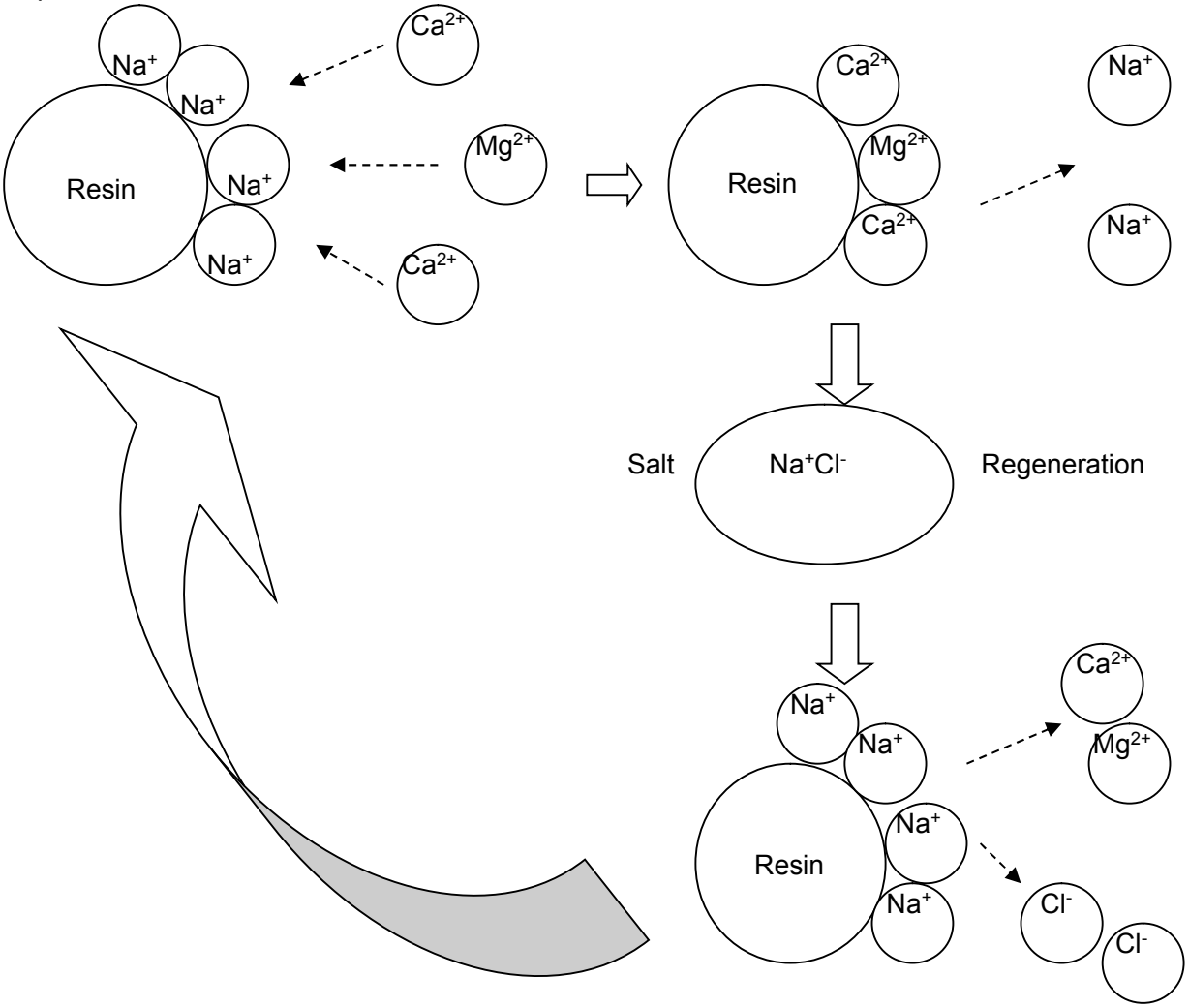
For soot adhesion prevention, it is to be desired that the condition close to the complete combustion is kept, but the soot adhesion cannot be prevent to be caused completely under heavy oil combustion. The maintenance of the equipment such as the burner maintenance which the crews carry out normally is the work not only for trouble prevention but also to keep the boiler good combustion condition and boiler efficiency. For scale we explain the following item.

Q2: Role of Water Softener?

A2:

Water softener removes the hardness (Calcium Ca, Magnesium Mg) in raw water (Hard Water) and changes the hard water to the soft water. Then, we would like to explain the mechanism of the water softener?

The water softener is equipped with the cation exchange resin. (hereinafter referred to as the “Resin”) The resin charged in the resin tank of the water softener removes the hardness in the raw water. For daily use of boiler, the soft water is checked by the hardness indicator. After the check, if the some hardness leakage is found in the water from the water softener and the each part of the water softener is normal, this means that it exceeds the allowable removal hardness volume of the resin. If the service water volume into the softener exceeds the regular volume, the resin cannot remove the hardness. Then “Regeneration” is to be carried out. “Regeneration” means the resin washing with the salt water, therefore, the resin capacity restores again by regeneration. In the event of the water softener for marine boiler, the sea water normally is used for regeneration. The hardness adhered on the resin flows out and the capacity of the resin restores by sea water going through the resin. The soft water can be supplied into the boiler at the all time by regeneration. However, the capacity of the water softener also declines year by year. This is the resin deterioration year by year. The main factor are the resin abrasion, expansion explosion, iron, microbe adhesion. The resin replacement every 3 or 4 years is required.



Then, why is the soft water needed for the steam boiler?

If the supply water contains the hardness, the hardness is condensed in the boiler as heating, becomes the scale, and then adheres inside the water tube. Then, the heat efficiency declines remarkably as the scale adhesion because the heat conductivity of the scale is very low. Generally, the main troubles are the followings.

1) Heating surface of the water tube is over heated, and then brings about the factor of water damage.

2) The heating transfer is prevented, and then brings about the low boiler efficiency.

3) The flow area of the water tube is decreased, and then brings about bad circulation.

The scale is insoluble, if the scale adheres on the water tube, it is very difficult to remove it, the large scale work such as chemical cleaning is needed. Moreover, if the worst comes to the worst, the water damage is caused, and the large risk and cost such as water tube replacement and boiler body replacement is required.

The life of the boiler is depending on the maintenance of the water softener. We hope that you can understand the importance of the water softener.

*We also have a Fresh Water Generator which can generate the water whose hardness is close to ZERO. Please kindly check the ship.

If you have any questions, please contact nearest MIURA's office.
We hope to receive your continuous support in the future.

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