

# Fresh water Generator

## **Working Principle**

For heating and evaporation of the sea water in the freshwater generator, the waste heat in the jacket cooling water of the Diesel engine is used. The heat exchanger in the freshwater generator is connected to the jacket cooling water system of the Diesel engine, and is thus working as an extra cooler.

The jacket cooling water, which may reach a temperature between 60 and 90° C, is passed outside the tubes of the heat exchanger. During this passage the temperature will drop between 4 and 13° C depending on the amount of jacket cooling water used.

The controlled amount of sea feed water is led to the interior of the heat exchanger tubes, where it is heated under vacuum and evaporated by rising film evaporation, meaning that optimum conditions are achieved and scale formations minimized.

The vacuum required is obtained by means of a water ejector which automatically ensures correct conditions.

The generated vapours pass through the separator, in which the sea water drops are separated to the brine and discharged by means of a water ejector.

The saturated vapour rises to the sea water cooled condenses, and on the outside of the tubes it will condense into fresh water which is collected in a

shell and discharged by the freshwater pump. - The salinity of the fresh water produced is automatically controlled by the salinometer.

The temperature of the cooling water led through the condenser tubes will rise between 6 and 16° C depending on the flow chosen.

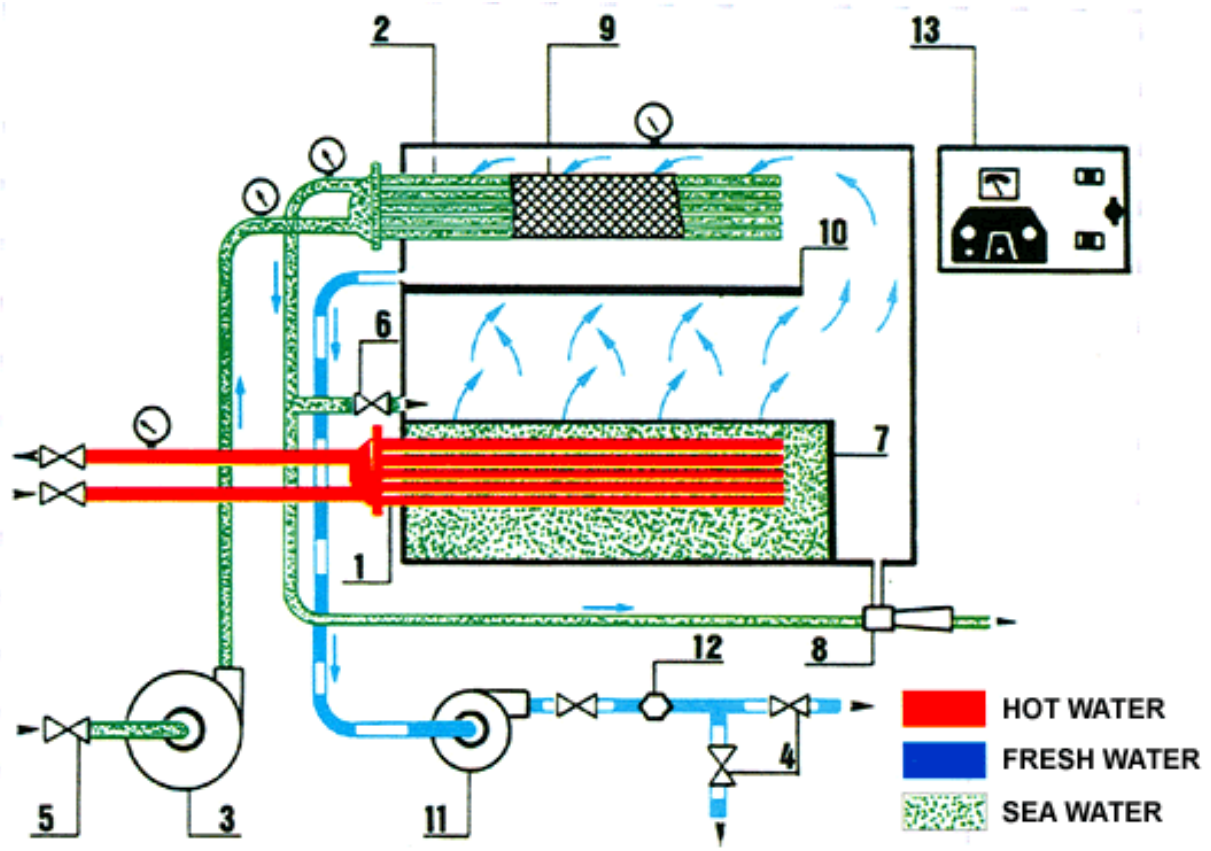
### **Alfa Laval freshwater generators**

The product of decades of research and development, the Alfa Laval freshwater generator concept offers effective solutions to all the problems commonly associated with traditional designs:

- Low scaling rate and high reliability mean very little maintenance
- High-grade materials make coating repairs a thing of the past
- Titanium plates in the heat exchangers and extensive use of non-ferrous materials prevent corrosion of vital parts
- Compact, lightweight design fits easily into engine rooms where space is at a premium

Alfa Laval freshwater generators utilize the waste heat generated by the main engine and/or the auxiliary engine as a heat source for the distillation process.

The range of Alfa Laval Plate Type Freshwater Generators covers capacities from 0.5 to 115 m<sup>3</sup> fresh water per 24 hours with a guaranteed maximum salinity of 2.0 ppm.



1	HEATER
2	CONDENSER
3	CIRCULATING PUMP
4	SOLENOID VALVE
5	SUCTION VALVE
6	FEED CONTROL VALVE
7	BRINE SPILLOVER WEIR
8	AIR AND BRINE EJECTOR
9	STEAM SEPARATOR
10	DISTILLATE TRAY
11	FRESH WATER PUMP
12	SALINITY CELL
13	CONTROL PANEL

## **Starting the Fresh Water Generator**

1. Before starting the fresh water generator we have to check that the ship is not in congested water, canals and is 20 nautical miles away from the shore. This is done because near the shore the effluents from factories and sewage are discharged into the sea can get into the fresh water generator.
2. Check whether engine is running on a full sea speed , the reason for this is that at low rpm the temperature of jacket water which is around 60 degrees and not sufficient for evaporation of water.
3. Check the drain valve present at the bottom of the generator is in close position.
4. Now open suction and discharge valves of the sea water pump which will provide water for evaporation, cooling and to the eductor for creating vacuum.
5. Open the sea water discharge valve from where the water is sent back to the sea after circulating inside the fresh water generator.
6. Close the vacuum valve situated on top of the generator.
7. Now start the sea water pump and check the pressure of the pump. The pressure is generally 3-4 bars.

8. Wait for the vacuum to build up. Vacuum should be at least 90% which can be seen on the gauge present on the generator. Generally the time taken for the generation of vacuum is about 10 minutes.
9. When vacuum is achieved open the valve for feed water treatment, this is to prevent scale formation inside the plates.
10. Now open hot water (jacket water) inlet and outlet valves slowly to about half. Always open the outlet valve first and then inlet valve. Slowly start to increase the opening of the valves to full open.
11. Now we can see that the boiling temperature starts increasing and the vacuum starts dropping.
12. The vacuum drop to about 85% which is an indication that evaporation is started.
13. Open the valve from fresh water pump to drain.
14. Switch on the salinometer if it has to be started manually. Generally it is on auto start.
15. Now start fresh water pump and taste the water coming out of the drain.
16. When fresh water starts producing it is seen that the boiling temperature drops again slightly and vacuum comes back to the normal value.

17. Check the water coming out of the salinometer is not salty and also check the reading of the salinometer. This is done to see if the salinometer is working properly or not and to prevent the whole fresh water from getting contaminated with salt water. The value of salinometer is kept below 10ppm.

18. After checking the taste of the water coming out of the salinometer, open valve for tank from the pump and close drain valve.

### **Stopping the Fresh water Generator**

1. Close the jacket water inlet valves. Generally inlet is closed first and then the outlet valve.

2. Close the valve for feed water treatment.

3. Stop fresh water pump and close valves.

4. Switch off the salinometer.

5. Stop sea water pump (ejector pump) after about 5 minutes.

6. Open vacuum valve.

7. Close sea water suction valve and overboard valve. This is generally not required as they are non- return valves. However, in case of valve leaking or damage, these valves are to be closed without fail.