

Biological Sewage Treatment Plant

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Discarding sewage produced onboard on a ship is one of the few tasks on a ship which should be taken utmost care of if one wants to save him and his shipping company from heavy fine. The sewage generated on the ship cannot be stored on the ship for a very long time and it for this reason it has to be discharged into the sea.

Though sewage can be discharged into the sea, we cannot discharge it directly overboard as there are some regulations regarding discharging of sewage that needs to be followed. Sewage on sea is generally the waste produced from toilets, urinals and WC scuppers. The rules say that the sewage can be discharged into the sea water only after it is treated and the distance of the ship is 4 nautical miles from the nearest land.



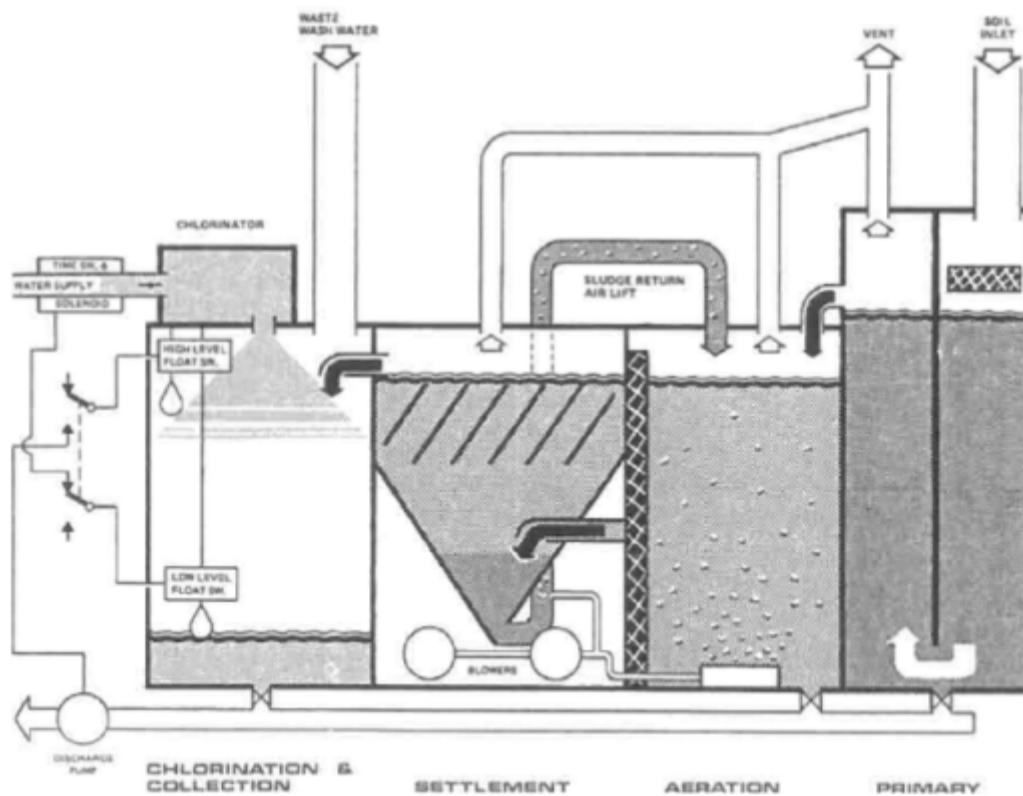
But if the sewage is not treated this can be discharged 12 nautical miles away from the nearest land. Also the discharged sewage should not produce any visible floating solids nor should it cause any discoloration of surrounding water.

Generally, ships prefer treating sewage before discharging to save themselves from any type of embarrassment. There are different methods of treating sewage available in the market, but the most common of them is the biological type for it occupies less space for holding tank, unlike those of the other methods. Moreover, the discharge generated from this plant is eco friendly. It is to note that each sewage treatment system installed onboard has to be certified by classification society and should perform as per their requirement and regulations.

Working of a Biological Sewage Plant

The basic principle of the working of a biological treatment plant is decomposition of the raw sewage. This process is done by aerating the sewage chamber with fresh air. The

aerobic bacteria survive on this fresh air and decompose the raw sewage which can be disposed off in the sea. Air is a very important criterion in the functioning of the biological sewage plant because if air is not present, it will lead to growth of anaerobic bacteria, which produces toxic gases that are hazardous to health. Also, after decomposition of the sewage with anaerobic bacteria, a dark black liquid causes discoloration of water which is not accepted for discharging. Thus in a biological sewage treatment plant the main aim is to maintain the flow of fresh air.



Division of Processes

The biological sewage plant is divided into three chambers:-

Aeration chamber

This chamber is fed with raw sewage which has been grinded to form small particles. The advantage of breaking sewage in small particles is that it increases the area and high number of bacteria can attack simultaneously to decompose the sewage. The sewage is decomposed into carbon dioxide, water and inorganic sewage. The air is forced through diffuser into the air chamber. The pressure of air flow also plays an important role in decomposition of the sewage. If pressure is kept high then the mixture of air and sewage will not take place properly and it will escape without doing any work required for decomposition. It is for this reason; controlled pressure is important inside the sewage treatment plant as this will help in proper mixing and decomposition by the agitation caused by air bubbles. Generally the pressure is kept around 0.3-0.4 bars.

Settling tank

The mixture of liquid and sludge is passed to settling tank from the aeration chamber. In the settling tank the sludge settles at the bottom and clear liquid on the top. The sludge present at the bottom is not allowed to be kept inside the settling tank as this will lead to growth of anaerobic bacteria and foul gases will be produced. The sludge formed is

recycled with the incoming sludge where it will mix with the later and assist in the breakdown of sewage.

Chlorination and Collection

In this chamber the clear liquid produced from the settling tank is overflowed and the liquid is disinfected with the help of chlorine. This is done because of the presence of the e-coli bacteria present in the liquid. To reduce these bacteria to acceptable level chlorination is done. Moreover, to reduce the e-coli, the treated liquid is kept for a period of at least 60 minutes. In some plants disinfection is also done with the help of ultra violet radiation. The collected liquid is discharged to overboard or settling tank depending on the geological position of the ship. If the ship is in restricted or near coastline then the sewage will be discharged into the holding tank; otherwise, the sewage is discharged directly into the sea when high level is reached and is disposed automatically until low level switch activates.