

| <i>No.</i> | <i>Contents</i>                  |
|------------|----------------------------------|
| <i>1.</i>  | <i>PROCESS DISCRPTION</i>        |
| <i>2.</i>  | <i>TECHINICAL SPECIFICATIONS</i> |



**System : Fresh Water Maker**

## **1. Process Description :**

### **1.1 GENERAL DESCRIPTION**

Sea water containing high total suspended solids (TSS), total dissolved solids (TDS) and bacteria cannot be used for clean water and drinking water. This water can be made usable by reducing the suspended solids, the total dissolved solids and bacteria to the recommended levels.

Conventionally multi stage evaporation or flash distillation is used to produce clean drinking water on ships and ocean going vessels. Due to higher maintenance cost and downtime these are replaced by membrane based fresh water makers built with reverse osmosis technology.

Reverse osmosis is a process widely adopted to reduce total dissolved solids and bacteria by application of external pressure on the solution that contains higher concentration of dissolved ions, thus forcing water through the semi – permeable membrane in the opposite direction, leaving behind the dissolved ions and suspended solids. In this process, the water that passes through the membrane is commonly referred to as permeate (product water), and the water that remain behind the membrane along with the dissolved and suspended solids is referred to as the concentrate (reject water).

In these fresh water maker units, the suspended solids reduction is done by media filter followed by cartridge filter as pre-treatment before reverse osmosis. The bacteria and total dissolved solids reduction are accomplished by reverse osmosis (R.O). It is a skid mounted system.

The amount of pure water that can be produced depends on a number of factors:

- The operating pressure
- The salt content of the feed water
- The feed water temperature

## **1.2 PROCESS DESCRIPTION**

The system has been designed with treatment process as follows:

### **Media Filter**

Sea water strained for larger particles are passed through the media filter to remove any large suspended matter.

### **Micron Filter – Pre-filters**

The water discharged by the low pressure pump through pre-filter which further reduces all suspended solids to an approximate five (5) micron particle size. A 20 micron filter is placed before the five micron.

### **Chemical Dosing**

Anti-scalant dosing is provided with a dosing pump and tank with continuous dosing anti-scalant to the inlet water before entering the membrane to protect the membrane from potential inorganic fouling.

### **Reverse Osmosis**

The filtered seawater then enters the high pressure pump and is discharged into the inlet of the reverse osmosis membrane module at a pressure of 800 psi (55 bars). Through the process of reverse osmosis potable drinking water is produced. The impurities containing largely salts (brine) stay behind and are automatically flushed overboard through the reject regulating valve.

### **UV Disinfection**

An Ultraviolet sterilization unit is provided to sterilize the potable water at the point of discharge

### **Fresh Water Flush**

This is an additional feature which is specially provided in our systems. During operation the produced water first fills up the flushing tank and once it is full then the water is delivered to the storage tank in the vessel for distribution. Once the system is stopped the sea water in the membrane modules are pushed out by the fresh/ clean water from the flushing tank and the system comes to a complete stop. This system is a unique feature in our system which ensures the life of membranes are long and maintenance cost is low. Flushing tank is utilized as cleaning tank during offline cleaning of the system.

## 2. Technical Specifications:

1. Dosing Pump
2. Booster pump/CIP Pump
3. High Pressure RO Pump
4. Control Panel
5. Dosing Tank
6. Cleaning (CIP) Tank
7. RO Membrane

8. Pre-Filtration unit

9. Multimedia Filter

10. Skid : Mild steel hot deep galvanize, painting

11. UV Sterilizer