Multiple Effect Desalination

Hitachi Zosen Corporation
Desalination Technology

Hitachi Zosen has been engaged in desalination business since the early 1970’s and has been dedicated to the research and development of desalination technology. Hitachi Zosen has provided more than 40 desalination projects (more than 1,000,000m³/d in total) to the customers all over the world with its excellent technology. Multi Stage Flash (MSF) and Multiple Effect Distillation (MED) process represent the evaporation method, and Reverse Osmosis (RO) process is membrane method, these three processes are typically applied to current commercial desalination plants. Hitachi Zosen is able to provide all of those processes and its capability allows the clients to select the most optimal process depending upon their requirements by considering the advantages of each process.

Multiple Effect Distillation

Both evaporation and membrane methods have their own advantages, however, evaporation methods have been widely used mainly in the Gulf countries today, because of their advantages, i.e., higher resistance to deterioration of raw seawater, and easy operation and maintenance. In particular, The advanced features of MED such as high thermal efficiency and smaller power consumption contribute to significant extension of its market share. Based on extensive experiences, comprehensive engineering capabilities and cutting-edge research & development, Hitachi Zosen Corporation satisfy all client’s requirements of MED process.

MED Process Flow

MED evaporator consists of some effects (Number of effect is depend on the design condition). Vapor, Heat source, is introduced into the tubes of the 1st effect. Inside tube, Vapor is condense as the cooling seawater drips from tube to tube sprayed from top of spray nozzle and Distillate water is collected into distillate box. Outer surface of the tube on the other hand, some of seawater evaporates and this vapor flows into the tubes of the next effect as heat source. This process repeats in every effect. Seawater is heated by condenser or pre-heater before it reaches to each effect. Thermo compressor enhances the plant efficiency (Gain Output Ratio=GOR) by recycling a part of vapor sucked from low temperature/ low pressure effect mixed with high temperature steam to supply to the 1st effect. Recycling low temperature/low pressure vapor contribute to reducing vapor consumption.
In order to constantly progress technology and to promote research and development, experimental equipment was built:

- Performance evaluation of MED plant using practical large-scale experimental equipment
- Optimization of MED structure utilizing numerical simulation technique
- Elementary technology development (spray nozzle, thermo compressor, etc.)

ADVANTAGE IN HITS MED:

- High heat-transfer efficiency compared to other thermal processes
- Low vapor consumption and high performance efficiency by using of thermo compressor and seawater pre-heater
- Less scale formation and less maintenance by low temperature operation
- Customize Plant Capacity optimized for the plant’s specific environment and site conditions.
- High Gain Output Ratio (GOR>10 (GOR= Distillate(kg)/vapor supply (kg))
- High Flexibility of operating load range (40%~100%)
- Guaranteed high purity distilled water (TDS <5ppm)
- High anticorrosive material selection for long-life operation (Duplex, Ti tube and Aluminium Brass tube)

RESEARCH AND DEVELOPMENT:

Hitachi Zosen has capability of not only engineering but also procurement and construction as full turn-key basis.

- Capability to accomplish of Large-scale EPC project
- Designing ancillary facility such as Seawater Intake and Re-mineralized equipment
- Flow analysis and Stress analysis that achieve high durability and performance
- Overall Plant Design with PDMS (3D-CAD)
- Utilizing international procurement and transportation Know-how
- Good after-care services

ENGINEERING CAPABILITY:

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