MemTeck™ RO DESALINATION SYSTEM

Technical information

I. Design foundation

1.1 Water production use: domestic and drinking water.

1.2 System output: 1,2,3,4,5,6,7,8,9,10,20,30,40,50,100 Tm^3/H.

1.3 System recovery rate: 50% up to 90% (new design).

II. The main basis of this scheme is as follows:

2.1 Seawater/Brackish/industrial water sources, preliminary proposed TDS of 2,000-40,000.

2.2 Design boundary: from water intake point to terminal water use.

2.3 Other design basic conditions involved will be discussed and determined in the technical liaison.

2.4 Out put water quality: drinking water quality/ industrial water quality

2.5 System external requirements:

2.6 Supply cable: send the power cable to the distribution of the transformer according to the capacity of the scheme

2.7 Outlet pipe: contains no final branch water supply.

III. Process flow and description:

3.1 Reverse osmosis part: The reverse osmosis device is mainly composed of scale inhibitor injection system, security filter, high pressure pump, energy recovery device, reverse osmosis membrane elements, pressure pipe, reverse osmosis water tank, instruments, instruments, etc.

3.2 High pressure pump

The working force of the reverse osmosis device is the pressure difference. The high-pressure pump rises the pre-treatments raw water to the reverse osmosis pressure, to enable the reverse osmosis process, that is, overcome the water osmosis pressure to make water molecules through the reverse osmosis membrane to the freshwater layer. Model of

high pressure pump is to be determined based on selected design normally Grundfos Pumps, Danfoss Pumps, CAT Pumps are the pumps will be chosen for our design

3.3 Reverse osmosis host

a)membrane element

Memtech will provide you with their latest high tech RO membranes to meet your requirements

b)Secondary Configuration

Cleaning of the reverse osmosis device

The more perfect the pre-treatment design of the reverse osmosis device is, the number of cleanings of the membrane elements can be reduced. However, no matter how perfect the pre-treatment process is, in the long-term operation process, the reverse osmosis membrane surface will always accumulate various pollutants on the water surface of the membrane. Thus so that the membrane performance decreases, the component inlet and outlet pressure difference increases. Therefore, in addition to low-pressure washing before the daily start-stop device, regular chemical cleaning, sometimes sterilization. Cleaning device shall be equipped with cleaning solution tank, cleaning pump and cleaning filter. Clean the cleaning interface reserved by the reverse osmosis assembly, wash fresh water, and replace concentrated seawater to prevent insoluble inorganic salts from settling on the membrane surface during the shutdown to ensure the efficient treatment performance of the system.

Material

Designate system

- **Pipe parts and valves.** Steel lining glue (plastic) and UPVC for low pressure seawater and concentrated water pipes; 316SS for high pressure pipes and UPVC for desalination water and products.
- Valve:
  - low-pressure valve selection of UPVC or steel lining glue. The

high-pressure valve is made of 316 stainless steels.

- The system shall be equipped with high and low-voltage protection switches to ensure the safe and reliable operation of the reverse osmosis system.
- The reverse osmosis device shall be equipped with a secondary instrument to display and monitor the main parameters such as water production and conductance in the operation of the equipment.

- Sampling port shall be set on the water production side of each pressure membrane tube to facilitate sampling.

3.4 Water posttreatment of the products

Product water sterilization: add sodium hypochlorite or other fungicide, at the outlet of the reverse osmosis device or the product water supply system, to make the pipe network residual chlorine 0.3 mg / L. Water PH of the product: in the product water supply system or through limestone filter, the adjusted water production PH is 6.5-8.5 (hardness 29-75 mg / L, $CaCO_3$count).

3.5 Control instructions

According to reverse osmosis desalination process, control system for direct control of each process unit. It can meet the requirements of automatic operation.

3.6 Control of pretreatment part and reverse osmosis and desalination part

The pretreatment part is the control point. When the reverse osmosis desalination tank is in the low limit position, the low-level switch inputs the switch signal to the PLC, and the PLC controls the pretreatment part. When the reverse osmosis desalination water tank level, the high-level switch inputs the switch signal to the PLC, the reverse osmosis desalination part is stopped, and the pretreatment part is stopped successively.

3.7 dosing control

The additive metering pump is adjusted by the stroke in advance, and after the addition amount is determined, through the start linkage with the original water booster pump and the high-pressure pump to realize

the automatic control of the metering pump, the automatic addition of the agent, and the manual addition can also be withdrawn.

3.8 Reverse osmosis part

The inlet water of the reverse osmosis high pressure pump has set pressure switch. When the pressure is less than the set pressure, the control high pressure pump shall stop operation and the energy recovery device stops working one after another. A pressure switch is set on the reverse osmosis water production side pipeline. The PLC controller will output the switch signal, stop the high-pressure pump operation, the controller closes the whole reverse osmosis system, wait for the high pressure to be eliminated, and restart. An electric (or electromagnetic) valve is set on the side of the reverse osmosis concentrated water. Before the high pressure pump runs and after the high pressure pump stops, the switch signal of PLC output will automatically enter the low pressure flushing state; the electric valve is also set on the water production side to control the water production discharge or product water.

3.9 Cleaning system control

The cleaning system set by the system implements separate manual control, namely manual operation cleaning process.

3.10 Equipment Technical Specification (equipment involved in the project)

Main technical parameters:

Equipment name: seawater/brackish/industrial

Desalination device

Type: dosing device + pre-treatment + ultrafiltration + reverse osmosis device

Layout mode: yet to be determined
Quantity: 1 set
Final water output: 1 to 100 t / h
System final recovery rate: ~90%
Water quality after treatment: domestic and drinking water

4.0 Each set mainly includes:

① The original pool
Quantity: 1 set

②.raw water pump
Quantity: 2 sets

③.Multi-media filter
Quantity: 1 set
Working pressure: 0.6MPa
Flow rate: greater than 100m³ / h
Quartz sand: 0.5-1.2mm/800mm
Material: carbon steel lining glue

④.condensate dispensing device
Quantity: 1 set
Add method: metering pump injection
Type: 1 box, 1 pump
- -Mechanical diaphragm metering pump
Quantity: 1 unit
-Solution box
Quantity: 1 unit
material quality: PE

⑤. carbon filter
Quantity: 1 set

⑥.ultrafiltration system

Quantity: Pending set
Type: outer pressure type hollow fiber membrane
Film material: PVDF
Nominal aperture: 0.03 m
Membrane area: 33m2
Internal diameter of hollow fiber: 0.7mm
External diameter of hollow fiber: 1.25mm
PH range: 2~11 (short-time chemical cleaning: PH=2-12)
Operating water temperature: 5~40℃
Maximum water inlet pressure: 6.0bar
Maximum allowable pressure difference on both sides of the membrane: 3.0bar (<35℃)
Backwash frequency: every 20-60 minutes (as appropriate)
Backwash time: 60-100 seconds per time
Backwash pressure: 1.0bar
Reverse wash flow rate: 100 l/m2.h
Gas scrubbing frequency: 1 time / 8-24 hours
Gas scrubbing pressure: 1.0bar
Gas scrubbing strength: 5-7 N m3 / h.branch
Gas source: oil-free

⑦.Scale inhibitor dressing device
Quantity: 1 set
Add method: metering pump injection
Type: 1 box, 1 pump
Production, land:
-Mechanical diaphragm metering pump
Quantity: 1 set
-Solution box
Quantity: 1 set

⑧. Security filter
Quantity: 1 set

⑨ stage I vertical multistage high-pressure pump
Quantity: 1 unit
Overcurrent material: SS316L stainless steel
Connection mode: Flange connection
Supporting accessories: pressure gauge, valves and pipe fittings

⑩.Level 1 reverse osmosis device

Quantity: 1 set
Recovery rate: the design recovery rate is 60%
Feed water water temperature: 15-25℃
Make, make, business:
-Reverse osmosis membrane element
Quantity: Pending set
Model number: 4040/8040
Type: a polyamide composite membrane
Membrane area: 400ft2 (37m2)
Test desalting rate: 99.75% (single branch)
Operating pressure: 800psi
-Reverse osmosis membrane shell
Quantity: Pending set
Material housing: FRP (FRP)
Connection pipe: SUS304 stainless steel / UPVC
Design pressure: 1,000 p s i
Working pressure: 5.5Mpa
-High pressure protector
Quantity: 1 set
-Low voltage protector
Quantity: 1 set
Model number: JC206
-Ineding water conductivity meter
Quantity: 1 set
Signal output: 4-20mA
Scale range: 0-2,000 u s / cm
-Water-producing electric conductivity meter
Quantity: 1 set
Signal output: 4-20mA
Scale range: 0-500us / cm
-Water flow meter
Quantity: 1 set
Origin: joint venture
-Heavy water flowmeter
Quantity: 1 set
-Quick-open valve for thick water discharge
Quantity: 1 only one

Material: stainless steel
-body frame Material: 316
-Pipe valve parts
Quantity: 1 set
UPVC part: 1 set (low voltage)
Stainless steel part: 1 set (high pressure)

⑾.Buffer part (equipped with high, medium and low liquid level controller)
Specifications: Pending determination
Effective volume: be determined
Design pressure: normal pressure

⑿.The PH automatic dosing device
Quantity: 1 set
Add method: metering pump injection
Type: 1 box, 1 pump
-electromagnetic metering pump
Quantity: 1 unit
-Solution box
Quantity: 1 unit

⒀.Secondary vertical multi-stage high-pressure pump
Quantity: 1 unit
Overcurrent material: SS304 stainless steel
Connection mode: Flange connection
Supporting accessories: pressure gauge, valves, and pipe fittings

⒁. Secondary reverse osmosis device
-Reverse osmosis membrane element
Model number: 8040/4040
Type: a polyamide composite membrane
Membrane area: 400ft2 (37m2)
Nominal desalination rate: 99.75% (single branch)
Operating pressure: 800psi
-Reverse osmosis membrane shell
Material housing: FRP (FRP)
Connection pipe: SUS304 stainless steel / UPVC
Design pressure: 1,000 p s i
Working pressure: 5.5MPa
-High pressure protector
Quantity: 1 set

-Water-producing electric conductivity meter

Quantity: 1 set

Signal output: 4-20 mA

Scale range: 0-500us /cm

-Water flow meter

Quantity: 1 set

Digital/standard

-Heavy water flowmeter

Quantity: 1 set

- -Quick-open valve for thick water discharge

Quantity: 1 only one

Material: stainless steel

-Pipe valve parts

Quantity: 1 set

UPVC part: 1 set (low voltage)

Stainless steel part: 1 set (high pressure)

Make, make, business:

⑮. Membrane chemical cleaning device

— ultrafilter

Quantity: 1 set

Production, land:

-Cleaning water pump

Quantity: 1 unit

Material: 304 stainless steels

-Cleaning solution box

Quantity: 1 unit

⑯. Intermediate water tank (equipped with stainless steel liquid level controller)

Design pressure: normal pressure

Operating temperature: 4-50° C

⑰. Middle pump

⑱. Other equipment

- -The PLC electrical control cabinet

Quantity: 1 set

-Pipe valve parts

Quantity: 1 set

material quality:UPVC

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