

Nuclear Power Plant Liquid Radwaste Treatment System (R/O Package)

- Oil, suspended solids above $0.4\mu\text{m}$, materials causing turbidity, and organics are removed in the Pretreatment System using Microfiltration(MF)
- Dissolved Ions, Ionic Particulates are removed by the Reverse Osmosis(RO) System
- Residual Radionuclides(Co, Cs, I, etc)are removed by the Ion Exchange System

R/O Package is the system to treat the radioactive liquid wastes generated in the Nuclear Power Plant below the discharge limit, which is developed by ENE's technologies and consists of the microfiltration combined with reverse osmosis and ion exchange system

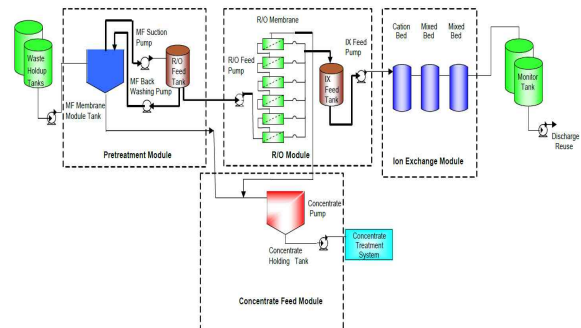
Applications in the Industry Fields

- Treatment of Radioactive Liquid Wastes from the Nuclear Power Plants
- Mobile Type of Radioactive Liquid Wastes Treatment System
- Decontamination Wastes Treatment
- Treatment of Various Wastewater from Radioactive Liquid Wastes & Industries
- Sewage Treatment
- Dyeing Wastewater Treatment



System Description

Reverse Osmosis(RO) membrane equipment package (RO Package or RO PKG is called), which can be applied to liquid radwaste treatment system of nuclear power plant, meet the criteria to treat liquid radwaste and to discharge effluent, consists of pretreatment module, reverse osmosis module, and ion exchange module as shown below, which are composed of two trains. The concentrate feed module is used to store the concentrate generated from RO PKG. The concentrate shall be sent and processed in the concentrate treatment system.



Pretreatment system removes the fine particles and organic materials which are existed in the collected liquid radwaste and prevents scaling, contamination, and damage of reverse osmosis membrane.

RO system removes the radioactive ions and the dissolved salts which are not processed by the pretreatment system. The permeate which is purified by RO membrane sends to the ion exchange feed tank, and The reject which is concentrated sends to the concentrate holding tank for transporting the concentrate to the concentrate processing facilities.

The cleaning time of RO membrane can be determined by monitoring the permeate flow rate of RO module and the differential pressure of RO membranes. In general, membrane cleaning is carried out with 'high-pH cleaners' and 'low-pH cleaners' in order to remove contaminants of membranes.

Backwashing radwaste is recycled and processed with the influent radwaste together. The ion exchange equipment removes Co, Cs, I ions in the permeate which are not removed in the RO equipment. The ion exchange system consists of three ion exchange vessels.

RO PKG discharges or handles more efficiently and effectively liquid radioactive waste according to the technical specifications. The concentrated liquid waste generated during operation is transported to the concentrate storage tank, and then to the concentrate treatment system by using concentrate pump.

RO PKG is monitored and recorded of the operating parameters of each system and run under the optimal operating conditions. Various instruments are installed. The operating parameters produced from each instrument are stored on your PC to allow analysis of the causes when the problem occurred.

The operator at the control room can operate R/O PKG using PLC, MMI and PC automatically or manually. Measured value and operating parameters of each instrument can be found on the monitor. In addition, Local panel and each equipment and pump can be also operated manually.



Design Conditions

• Performance

Activity Concentration of Effluent Processed by the Radioactive Liquid Wastes Treatment System

- Less than $5.0 \times 10^{-7} \mu \text{Ci/cc}$

Conductivity of Effluent Processed by the Radioactive Liquid Wastes Treatment System

- Less than $1 \mu \text{mhos/cm}$ (except boron)

• Decontamination Factor (DF)

- Pretreatment System

Cs/Rb > 1

All Other Isotopes > 10

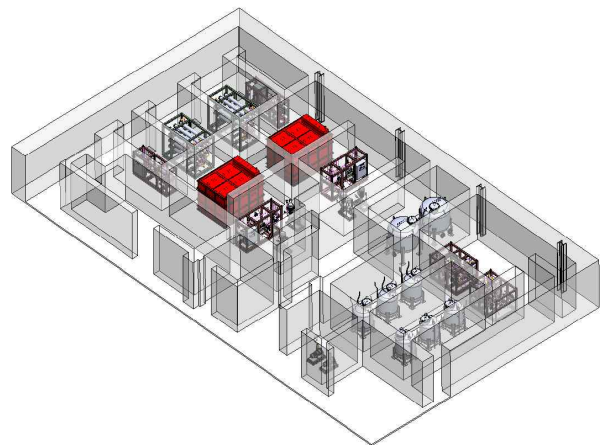
- RO System

Cs/Rb, All Other Isotopes > 100

- Ion Exchange System

Cs/Rb > 200

All Other Isotopes $> 1,000$



ENE has many years experience design, fabrication, installation, and operation experience of the radioactive liquid wastes treatment system-resulting design simplicity, maintainability and operability of its system.

Tel : 82-42-864-0970/0971

www.ene21.co.kr

e-mail : tryseo@ene21.co.kr