

# Microfilter/Reverse Osmosis Pilot Trailer

The microfilter/reverse osmosis pilot trailer from Siemens Water Technologies is a self-contained, trailer-mounted pilot system configured with:

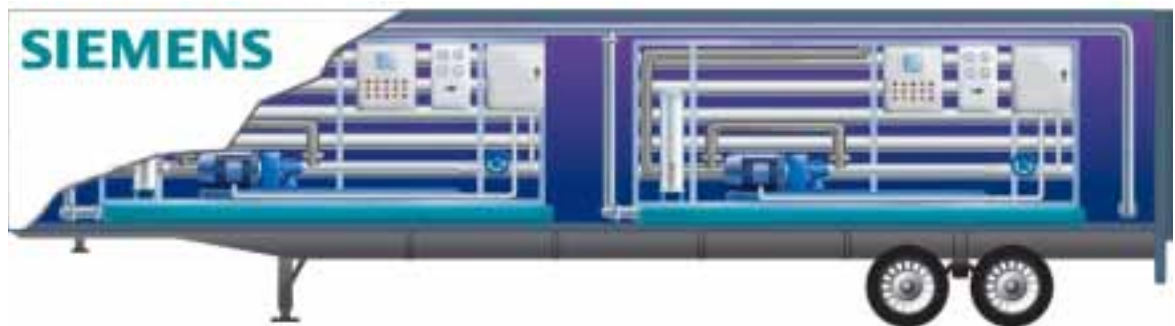
- A two-stage reaction system
- Memtek® microfiltration system
- Reverse osmosis pretreatment system
- Reverse osmosis system

The trailer is rated for a nominal flow of up to 10 gallons per minute and a reverse osmosis system recovery of 60 to 80 percent (depending upon application).

The influent wastewater to be pilot tested is processed through a two-stage reaction system for pretreatment prior to the microfilter. The pretreatment chemistry used in the two-stage reaction system can be adjusted to fit the application for precipitation of heavy metals, hardness, silica, fluoride, etc. from the wastewater. Following the two-stage reaction system, the wastewater gravity overflows into the concentration tank of the microfiltration system for solids separation.

The membrane microfiltration system uses cross-flow filtration for the removal of suspended solids. The microfilter's polymeric membrane separates the precipitated particles generated in the two-stage reaction system from the wastewater. The process pump of the microfiltration system circulates water through the microfilter membranes. The water, virtually free of suspended solids, passes through the membrane, while the suspended solids remain and accumulate in the recirculating concentrate. The water containing the suspended solids flows inside the membrane tubes at a high velocity. Particles present in the water help to clean the membrane surface due to the high velocity of the flow (~14 ft/sec), thus maintaining a stable filtration flow.

Permeate from the microfiltration system is then directed to the reverse osmosis pretreatment system. In this stage of the process, the wastewater is preconditioned to optimize the performance of the reverse osmosis system. This preconditioning can consist of pH adjustment, the addition of reducing agents, as well as the addition of an antiscalant.



Following the preconditioning step, the wastewater stream is processed through the reverse osmosis system. The reverse osmosis system is a water purification process using a semi-permeable membrane to purify the wastewater.

The preconditioned wastewater is pressurized in the reverse osmosis system and processed through the reverse osmosis membranes. The applied pressure reverses the natural osmotic effect in which a dilute salt solution will pass through an osmotic membrane into a more concentrated salt solution. In the reverse osmosis system, the pump pressure causes the water to pass from the concentrated salt solution into the dilute solution.

The degree of separation is determined by the physical/chemical equilibrium established across the membrane and related to the pressure and concentration differences across the membrane. Permeate from the reverse osmosis system will have a low concentration of total dissolved solids and may be used as recycle water. The concentrate from the reverse osmosis system will be high in total dissolved solids and will need to be disposed of.

The trailer is equipped with pH/ORP instrumentation for monitoring of the reaction system and reverse osmosis pretreatment system chemistry. The microfilter and reverse osmosis systems have flow and pressure instrumentation. Conductivity monitors are provided on the reverse osmosis system.

Siemens Water Technologies' field service technicians are available to provide system start-up and training once the pilot trailer is installed at the customer's site.

**Specifications:**

- Dimensions (LxWxH): .....53' x 8'-8" x 13'-6"
- Shipping Weight: .....22,000 pounds
- Operating Weight: .....35,000 pounds
- Feed Water (gpm):.....10 (nominal)
- RO Product Water (gpm): .....6 to 8 (nominal)
- RO Concentrate (gpm): .....2 to 4 gpm (nominal)
- RO Recovery: .....60 to 80 percent (nominal)
- Electrical Requirements: .....480 Volt, 3 Phase, 60 Hertz, 75 Amps
- Air Requirements:
  - 40 scfm at 100 psi (oil and moisture-free, filtered with 10  $\mu$ m filter)
- Water: .....City water – 0.25 gpm @ 40 psi continuous; 30 gpm @ 40 psi intermittent
- Phone Line: .....Residential, analog phone line

**Service Connections:**

- Wastewater Influent:.....1" hose
- Microfilter Permeate:.....2" FPT
- RO Permeate: .....3/4" FPT
- RO Reject: .....3/4" FPT
- Microfilter Sludge: .....1.5" MPT
- City Water: .....1" hose
- Air: .....1/4" MPT

- Control Panel/PLC .....Allen-Bradley®
- Reaction System Model: .....RXP250
- Microfilter Model:.....EFC412
- RO Pretreatment Model:.....ROPT10
- RO Model:.....Vantage® RO – M41

**Instrumentation:**

**Microfilter**

- Concentration Tank Level Switches
- Product Flow
- System Pressure Gauges

**RO**

- Feed/Product Water Conductivity
- Product, Reject, Recycle Flow
- System Pressure Gauges

Flow and recovery rates are nominal and application specific.



Siemens  
Water Technologies  
2000 Ericsson Drive  
Warrendale, PA 15086  
866.525.0621 toll-free  
724.772.6520 phone  
724.772.6521 fax

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