



Ion Exchange

Industrial water treatment systems for the removal of inorganic dissolved solids to prevent scaling.



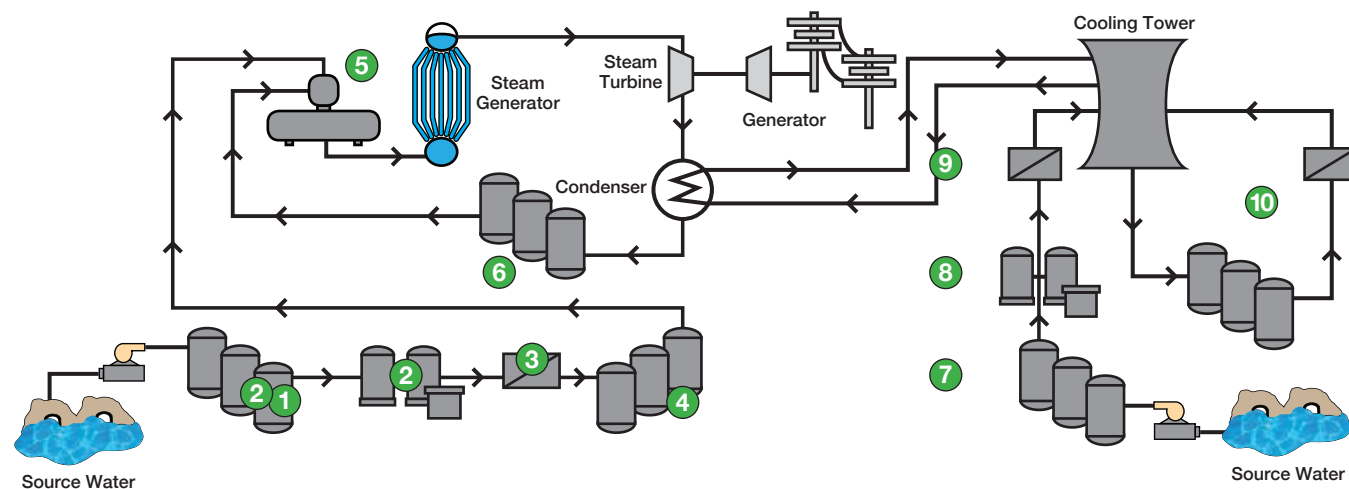
COCHRANE
by newterra

cochrane.com



Ion Exchange Technologies

Ion Exchange Equipment – the ion exchange process is an exchange of one ion for another, using a synthetic resin to perform the transfer of ions. These technologies are widely used for the removal of inorganic dissolved solid impurities from the feed water to steam-generating boilers or other process equipment to prevent scaling and oxidation damage.



1. Boiler Make-up Water – Filtration

Multimedia Filtration
Screen Filtration
Activated Carbon Filtration
Iron Filtration
Microfiltration/Ultrafiltration

2. Boiler Make-up Water – Softening

Sodium Zeolite Softening
Lime Softening
Nanofiltration

3. Boiler Make-up Water – Dissolved Solids Reduction

Nanofiltration
Reverse Osmosis

4. Boiler Make-up Water – Polishing

Demineralization
Electro-deionization

5. Deaeration

Counterflow Deaeration –
Spray/Tray
Parallel Downflow Deaeration –
Spray/Tray
Atomizing Deaeration – Spray
Vacuum Deaeration

6. Condensate Recovery –

Condensate Treatment
Mix Bed Condensate Polishing
Deep Bed Condensate Polishing

7. Cooling Tower Make-up Water Filtration

Multimedia Filtration
Screen Filtration
Iron Filtration
Microfiltration/Ultrafiltration

8. Cooling Tower Make-up Water Softening

Sodium Zeolite Softening
Nanofiltration

9. Cooling Tower Make-up Water Filtration

Nanofiltration
Reverse Osmosis

10. Cooling Tower Water – Blowdown Recovery and Recycle

Multimedia Filtration
Screen Filtration
Activated Carbon Filtration
Microfiltration/Ultrafiltration
Reverse Osmosis



Softening

Construction

Vessels: Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options

Design Pressure: As required

Internals: Stainless steel or schedule 80 PVC

Media: Synthetic strong acid cation resin (sodium form), coarse gravel

Regeneration Method: Sodium chloride brine

Face Plumbing: Carbon steel, stainless steel or schedule 80 PVC

Valve Operation: Pneumatic, water, electric or manual actuated

Skid Mounted Option: Carbon steel or stainless steel

Controls: PLC, stager/timer, metered or manual



Advantages

- Provides effective continuous removal of water hardness and low levels of dissolved iron
- Can be automatically regenerated based on manual, time or metered flow demand initiated
- Inlet/outlet pressure gauges
- Efficient internal designs provide a typical 10 PSI pressure drop across tank when clean
- Self adjusting backwash flow control
- Safety air release valve for pressure fluctuations
- Minimum energy and maintenance requirements
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options
- Clear backwash drain line for visual inspection (PVC plumbing only)

Purpose

- To remove hardness (scale forming calcium and magnesium ions) and replace with soluble sodium ions
- Hardness can easily damage plumbing, valves and downstream equipment
- Hardness can foul RO membranes
- Hardness is harmful to boilers and can cause scaling and thermal efficiency loss

Principle of Operation

Feed water enters the vessel and is evenly distributed over a bed of cation exchange resin. The water then flows down through the bed where the resin continues to exchange ions of sodium for calcium and magnesium. The softened water enters the distributor system at the bottom of the vessel and travels upward via the center riser tube where it is then piped out of the vessel.

When throughput capacity of the system is exhausted, the unit must be taken off line and regenerated. There are four distinct phases: backwash, salt brine addition, slow rinse and fast rinse. This process is designed to restructure the resin bed to its original form and capacity. The total regeneration process takes approximately 90 minutes after which the vessel is then switched back into normal operation.



Condensate Polishing (Sodium or Amine Cycle)

Construction

Vessels: Carbon steel, stainless steel, ASME coded/stamped options

Vessel Lining: Optional epoxy coating

Design Pressure: As required

Internals: Stainless steel

Media: Synthetic high temperature rated strong acid cation resin (sodium form)

Regeneration Method: Sodium chloride brine or user preferred amine

Face Plumbing: Stainless steel

Valve Operation: Pneumatic, water, electric or manual actuated

Skid Mounted Option: Carbon steel or stainless steel

Controls: PLC, Semi or fully automatic



Advantages

- Provides effective removal of water hardness in boiler condensate
- Provides effective removal of iron/ copper oxides in boiler condensate
- Can be automatically regenerated based on manual, time or metered flow demand initiated
- Inlet/outlet pressure gauges
- Efficient internal designs provide a typical 10 PSI pressure drop across tank when clean
- Minimum energy and maintenance requirements
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options

Purpose

- To remove hardness (scale forming calcium and magnesium ions) and replace with soluble sodium ions
- To remove iron/copper oxides and replace with soluble sodium ions
- Hardness and iron/ copper oxides in boiler condensate can easily damage plumbing, valves and downstream equipment
- Hardness and iron/copper oxides in boiler condensate are harmful to boilers and can cause scaling and thermal efficiency loss

Principle of Operation

Feed water enters the vessel and is evenly distributed over a bed of high temperature strong acid cation resin media. The water then flows down through the bed where the resin continues to exchange ions of sodium for calcium, magnesium and iron/copper oxides. The water enters the distributor system at the bottom of the vessel and is piped out of the vessel.

When pressure loss of the system exceeds a preset value, the unit must be taken off line and cleaned/ regenerated. There are four distinct phases: backwash, salt brine addition, slow rinse and fast rinse. This process is designed to restore the resin bed to its original form and capacity. The total regeneration process takes approximately 90 minutes after which the vessel is then switched back into normal operation.



Dealkalizing

Construction

Vessels: Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options

Vessel Lining (steel only): Optional epoxy coating

Design Pressure: As required

Internals: Stainless steel or schedule 80 PVC

Media: Synthetic strong base anion resin (sodium chloride form), coarse gravel

Regeneration Method: Sodium chloride brine, caustic

Face Plumbing: Carbon steel, stainless steel or schedule 80 PVC

Valve Operation: Pneumatic, water, electric or manual actuated

Skid Mounted Option: Carbon steel or stainless steel

Controls: PLC, stager/timer, metered or manual



Advantages

- Provides effective, continuous alkalinity removal
- Can be automatically regenerated based on manual, time or metered flow demand initiated
- Inlet/outlet pressure gauges
- Efficient internal designs provide a typical 10 PSI pressure drop across tank when clean
- Self adjusting backwash flow control
- Safety air release valve for pressure fluctuations
- Minimum energy and maintenance requirements
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options
- Clear backwash drain line for visual inspection (PVC plumbing only)

Purpose

- To remove 90% alkalinity
- Increases boiler system efficiency by increasing concentration cycles and thus reducing energy wasting blowdown
- Inhibits the release of corrosion damaging CO₂ caused by the boiler breakdown of bicarbonate alkalinity.

Principle of Operation

Softened feed water enters the vessel through an inlet valve and is sprayed out over a bed of strong base anion resin media. The water then flows down through the bed where the resin continues to exchange ions of chloride for bicarbonate, carbonate, nitrate, phosphate and sulfate. The dealkalized water enters the distributor system at the bottom of the vessel and travels upward via the center riser tube where it is then piped out of the vessel. When throughput capacity of the system is exhausted, the unit must be taken off line and regenerated.

There are four distinct phases: backwash, salt brine addition, slow rinse and fast rinse. This process is designed to restructure the resin bed to its original form and capacity. The total regeneration process takes approximately 90 minutes after which the vessel is then switched back into normal operation. A slight amount of caustic soda addition during the salt brine phase is required to obtain 90% alkalinity removal.

Construction

Vessels: Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options

Vessel Lining (steel only): Rubber

Design Pressure: As required

Internals: Stainless steel or schedule 80 PVC

Media: Strong or weak acid cation (hydrogen form) resin, strong or weak based anion (hydroxide form) resin, coarse gravel

Regeneration Method: Hydrochloric or sulfuric acid, caustic soda

Face Plumbing: Carbon steel, stainless steel or schedule 80 PVC

Valve Operation: Pneumatic, water, electric or manual actuated

Skid Mounted Option: Carbon steel or stainless steel

Controls: PLC, stager/timer, metered or manual



Advantages

- Provides very low total dissolved solids
- Can be automatically regenerated based on manual, time, metered flow or conductivity
- Inlet/outlet pressure gauges
- Efficient internal designs provide a typical 10 PSI pressure drop across tank when clean
- Minimum energy and maintenance requirements
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options

Purpose

- To remove cations and anions to a very low level
- Total dissolved solids cause scaling and under scale corrosion in industrial processes
- Total dissolved solids will scale and foul boiler tubes inhibiting heat transfer

Principle of Operation

The twin components, plumbed in series, of this type of demineralization (depending on feed water quality) are a strong or weak acid unit that removes nearly all cations followed by a strong or weak base unit that removes nearly all anions. Feed water enters the vessel and is distributed over the media. The water then flows down through the bed where the resin continues to exchange ions of hydrogen (H+) for cations in the first unit followed by caustic (OH-) for anions in the second unit. The result is a highly efficient system that removes nearly all dissolved solids with very close to neutral pH.

The purified water enters the distributor system at the bottom of the vessel and it is then piped out of the vessel. When throughput capacity of the system is exhausted, or conductivity rises above a target value, the units must be taken off line and regenerated. There are four distinct phases: backwash, acid addition for the cation unit and caustic addition for the anion unit along with slow rinse and fast rinse. This process is designed to restore the resin beds to their original form and capacity. The total regeneration process takes approximately 240 minutes after which the vessels are then switched back into normal operation.

Construction

Vessels: Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options

Vessel Lining (steel only): Rubber

Design Pressure: As required

Internals: Stainless steel or schedule 80 PVC

Media: Strong acid cation (hydrogen form) resin, strong based anion (hydroxide form) resin

Regeneration Method: Hydrochloric or sulfuric acid, caustic soda

Face Plumbing: Carbon steel, stainless steel or schedule 80 PVC

Valve Operation: Pneumatic, water, electric or manual actuated

Skid Mounted Option: Carbon steel or stainless steel

Controls: PLC, stager/timer, metered or manual



Advantages

- Provides extremely low total dissolved solids
- Effluent service water is near neutral pH
- Can be automatically regenerated based on manual, time, metered flow or conductivity
- Inlet/outlet pressure gauges
- Efficient internal designs provide a low pressure drop across tank when clean
- Minimum energy and maintenance requirements
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options

Purpose

- To remove all cations and anions
- Total dissolved solids are considered contaminants in some industrial processes
- Total dissolved solids will scale and foul boiler tubes inhibiting heat transfer

Principle of Operation

A mixed bed demineralizer contains two resins, strong acid cation and strong base anion, which are homogeneously mixed in one vessel. Feed water enters the vessel and is distributed over the media. The water then flows down through the bed where the resin continues to exchange ions of hydrogen (H+) for cations and caustic (OH-) for anions simultaneously. The result is a highly efficient system that removes all dissolved solids with very close to neutral pH. The purified water enters the distributor system at the bottom of the vessel and travels upward via the center riser tube where it is then piped out of the vessel. When throughput capacity of the system is exhausted, the unit must be taken off line and regenerated.

The individual resin components are separated by backwashing. The density difference between the two resins allows the strong acid cation resin to remain on the bottom while the strong based anion resin remains on the top. Using the respective regenerate, acid and caustic, each resin is then regenerated separately. After regeneration the resins are remixed using air. This process is designed to restructure the resin bed to its original form and capacity. The total regeneration process takes approximately 240 minutes after which the vessel is then switched back into normal operation.



About COCHRANE® by newterra

A Global Water Technology Leader

Newterra® is recognized as a global leader in the development of modular treatment solutions for water, sewage, wastewater and groundwater remediation for industrial, municipal, land development, commercial & residential markets. Our heritage of innovation in providing clean water solutions dates back to 1863. Over that time, Newterra has grown to over 200+ people, and we've installed thousands of treatment systems – some of which operate in the most extreme conditions on the planet.

Full Control from Start to Finish

At Newterra, we take full control of virtually every aspect of the treatment systems we build – from process design and engineering to manufacturing, installation, operations and ongoing parts & service support.

This award-winning approach ensures Newterra treatment systems meet our high standards for quality and on-time delivery.

40+

Professional
Engineers

200+

Employees
Worldwide

THOUSANDS

of Installations
Worldwide

newterra®

COCHRANE®

EPRO™

Qua-vac Vacuflow®

stormwaterRx®

Aeration Industries International

TIGG®



COCHRANE®
by newterra®

800.633.7435 | 800.420.4056
cochrane.com