Filtration for Industrial Applications
Filtration Equipment – technologies that are widely used for the removal of various impurities and contaminants from the feed water to steam-generating boilers (or other process equipment). Typical impurities are suspended solids, organics, chlorine and iron which can cause fouling, 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 – Filtration
   - Dissolved Solids Reduction
   - Nanofiltration
   - Reverse Osmosis
   - Demineralization

4. Boiler Make-up Water – Polishing
   - Demineralization
   - Electro-deionization

5. Deaeration
   - Countercurrent Deaeration – Spray/Tray
   - Parallel Downflow Deaeration
   - 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

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

10. Cooling Tower Water – Filtration
    - Nanofiltration
    - Reverse Osmosis
**Multimedia Filtration**

**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:** Anthracite, sand, garnet, fine gravel, coarse gravel
- **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 suspended solids filtration to 10 microns
- Contains several layers of various density media providing finer filtration than traditional sand-only filters
- Inlet/outlet pressure gauges
- Efficient internal designs
- Backwash flow control
- Pressure release valve for pressure fluctuations
- Safety vacuum release valve to prevent collapse
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options
- Clear backwash drain line for visual inspection (PVC plumbing only)
- Steam sanitizable tank options (stainless steel vessel only)

**Purpose**
- To remove suspended solids (TSS, turbidity, SDI): Dirt, sand, and sediment
- Suspended solids are abrasive and can easily damage plumbing, valves, and downstream equipment
- Suspended solids will plug filters and foul RO membranes
- Suspended solids are harmful to boilers and can cause fouling and thermal efficiency loss

**Principle of Operation**
Feed water enters the vessel through an inlet valve and is sprayed out over the bed of mixed media. The water then flows down through the bed. The coarse media layers trap large particles, and successively smaller particles are trapped in the finer layers of media. The result is a highly efficient filtering system since suspended solids removal takes place throughout the entire bed. The clean 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. Over time the media will trap additional solids resulting in an increased pressure drop across the vessel. Once the pressure drop reaches a preset level the control system (or manual initiation) will trigger a backwash mode. During backwash the flow is reversed and the feed water enters down through the riser tube, exits out the distributor system and flows upward through the bed of media. This increased velocity up through the bed disturbs the media and releases the trapped particles which are sent to a drain.

**Activated Carbon Filtration**

**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:** Granulated activated carbon (GAC)
- **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 chlorine removal
- Can be used for organics removal in certain applications
- Contains highly porous granulated activated carbon
- Inlet/outlet pressure gauges
- Efficient internal designs
- 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)
- Steam sanitizable tank options (stainless steel vessel only)

**Purpose**
- To remove chlorine, trace organics, color and odor
- Chlorine can affect taste & odor of water
- Chlorine can degrade certain materials such as plastics and composites
- Chlorine causes unreparable damage to most RO membranes
- Trace organics can affect taste & odor of water, be toxic and cause organic fouling of resins and membranes

**Principle of Operation**
Feed water enters the vessel through an inlet valve and is sprayed out over the activated carbon bed. The water then flows down through the carbon. The highly porous granulated carbon fines absorb and adsorb chlorine, organics and impurities. The result is a highly efficient filtering system that removes virtually all chlorine. The dechlorinated 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. Over time, the carbon will trap additional solids resulting in an increased pressure drop across the vessel. Once the pressure drop reaches a preset level the control system (or manual initiation) will trigger a backwash mode. During backwash the flow is reversed and the feed water enters down through the riser tube, exits out the distributor system and flows upward through the bed of carbon. This increased velocity up through the bed disturbs the carbon and releases the trapped particles which are sent to a drain. The backwash mode takes approximately ½ hour after which the vessel is then switched back into normal operation.
Iron Removal Filtration

**Principle of Operation**

Feed water enters the vessel through an inlet valve and is sprayed out over the calcium carbonate media. The water then flows down through the media. The acidic water slowly dissolves the calcium carbonate which increases the pH.

Once the pressure drop reaches a set level the control system (or manual initiation) will trigger a backwash mode. During backwash the flow is reversed and the feed water enters down through the riser tube, exits out the distributor system and flows upward through the bed. This increased velocity up through the bed disturbs the media and releases the trapped particles which are sent to a drain. The backwash mode takes approximately 1/2 hour after which the vessel is then switched back into normal operation.

**Advantages**

- Provides effective iron removal with little or no chemicals
- Certain media can also remove manganese, hydrogen sulfide and some metals
- Inlet/outlet pressure gauges
- Efficient internal designs
- 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)
- Steam sanitizable tank options (steel vessel only)

**Purpose**

- To remove iron, manganese, hydrogen sulfide and/or certain metals
- Iron quickly falls out of solution and sticks to surfaces causing scaling and fouling
- Iron can plug filters, plumbing and foul RO membranes
- Iron will foul boiler tubes inhibiting heat transfer
- Hydrogen sulfide has an objectionable odor and is highly corrosive
- Metals can cause fouling on plumbing and RO membranes

**Notes**

Feed water should be free of iron, oil and turbidity; Not a good choice for organic removal without chlorine present.

pH Adjustment Filtration (Calcite)

**Principle of Operation**

The result is an effective way to increase pH without the use of chemicals. The increased pH 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.

**Construction**

- **Vessels:** Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options
- **Internals:** Calcium carbonate
- **Face Plumbing:** Carbon steel, stainless steel or schedule 80 PVC
- **Skid Mounted Option:** Carbon steel or stainless steel

**Advantages**

- Provides pH adjustment without the addition of chemicals
- Inlet/outlet pressure gauges
- Safety air release valve for pressure fluctuations
- Stand alone tanks or modular skid mounted (pre-piped & pre-wired) options

**Purpose**

- To increase pH
- An effective alternative in applications requiring little or no chemicals usage

**Construction**

- **Face Plumbing:** PVC, Duplex SS or Super Duplex SS
- **Internals:** Stainless steel or schedule 80 PVC
- **Vessels:** FRP, Carbon steel or stainless steel

See table below for specific details.
About newterra

A Global Water Technology Leader

newterra is recognized as a 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 all the way 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. That also includes manufacturing our own MicroClear® UF membranes in newterra’s ISO 9001:2008 certified facility. This award-winning approach ensures newterra treatment systems meet our high standards for quality and on-time delivery.

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