Filtration

Highly Effective Filtration Systems for Process & Wastewater, in 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
   - Countercflow 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

11. Source Water

12. Cooling Tower

13. Source Water
**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

**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)

**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 downward 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

**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)

**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 downward 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.

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.

**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

**Trace organics can affect taste & odor of water,**
- **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**

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Iron Removal Filtration

**Construction**
- Frame: Painted carbon steel or stainless steel
- Membranes: Thin film composite
- Membrane Housing: FRP
- Controls: Customized for the end user
- Piping: PVC, Duplex SS or Super Duplex SS
- Instrumentation: Customized for the end user
- Cleaning System: Integral to the skid or stand alone
- Controls: Customized PLC controls

**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
- Clear backwash drain line for visual inspection (PVC plumbing only)
- Steam sanitizable tank options (steel vessel only)
- Minimum energy and maintenance requirements
- Safety air release valve for pressure fluctuations
- Inlet/outlet pressure gauges
- Stand alone tanks or modular skid mounted
- Customized backwash flow control
- Efficient internal designs
- Metals can cause fouling on plumbing and RO membranes

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

**pH Adjustment Filtration (Calcite)**

**Construction**
- Vessels: Carbon steel, stainless steel or FRP (fiber reinforced plastic), ASME coded/stamped options
- Internals: Stainless steel or schedule 80 PVC
- Media: 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
- Customized PLC controls
- Cleaning System: Integral to the skid or stand alone
- Controls: Customized for the end user
- Instrumentation: Customized for the end user
- Piping: Customized for the end user

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

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

**Iron Removal Filtration pH Adjustment Filtration (Calcite)**

<table>
<thead>
<tr>
<th>Media</th>
<th>Service Flow Rate (gpm / sq. ft.)</th>
<th>Backwash Flow Rate (gpm / sq. ft.)</th>
<th>pH Range</th>
<th>Max Temp. (oF)</th>
<th>Regeneration Method</th>
<th>Chemical Type</th>
<th>Also Required</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greensand</td>
<td>3-5</td>
<td>10-20</td>
<td>6.2 - 8.5</td>
<td>80</td>
<td>Intermittent or continuous</td>
<td>Manganese; hydrogen sulfide; Arsenic; Radium</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Greensand Plus</td>
<td>3-5</td>
<td>12-20</td>
<td>6.2 - 8.5</td>
<td>No limit</td>
<td>Continuous</td>
<td>Manganese; hydrogen sulfide; Arsenic; Radium</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Birm</td>
<td>5</td>
<td>10-15</td>
<td>6.8 - 9.0</td>
<td>None</td>
<td>None</td>
<td>Manganese; Suspended solids (excellent filter media)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>KDF-85</td>
<td>15</td>
<td>30</td>
<td>6.5 - 8.5</td>
<td>35 - 210</td>
<td>None</td>
<td>Hydrogen sulfide; Heavy metals</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Calcite</td>
<td>5</td>
<td>10</td>
<td>5.0 - 7.0</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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.
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.

Chaska, MN
Sales Office & Manufacturing Facility

Burlington, ON
Engineering & Sales Office

Brockville, ON
Head Office & Manufacturing Facility

Langgöns, Germany
MicroClear Office & Manufacturing Facility

Venice, FL
Sales Office, Manufacturing Facility & Service Center

Santiago, Chile
Sales Office & Service Center

200+
Employees

40+
Professional Engineers

10,000+
Installations Worldwide

Chaska, MN
Sales Office & Manufacturing Facility

Burlington, ON
Engineering & Sales Office

Brockville, ON
Head Office & Manufacturing Facility

Langgöns, Germany
MicroClear Office & Manufacturing Facility

Venice, FL
Sales Office, Manufacturing Facility & Service Center

Santiago, Chile
Sales Office & Service Center

Brockville, Canada

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Chaska, MN

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