An Overview of Tertiary Filtration Using Cloth Media Filtration Technology

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Acknowledgements

Manufacturers:

- Aqua-Aerobics Systems, Inc.
- Parkson Corporation
- Siemens Water Technologies
- Veolia Water Solutions and Technologies – Kruger Inc.
Outline

- What is Cloth Media Filter (CMF) Technology?
- Applications
- Geometries Available
- Flow Direction Options
- Selected Manufacturers
- Project Application – 30 MGD peak retrofit
- Questions
What is CMF Technology?

- **Cloth Media Filter Technology:**
  - Since early 1990’s
  - Cloth woven or fiber pile construction (manufacturer dependent) for 10 micron TSS removal.
  - Can get < 5 mg/L TSS, f(flux, influent TSS, etc.)
  - Filtration option in addition to granular media, microscreens, and membrane.
  - Several process technology manufacturers
  - Most common geometry is disc. (aka “Disc filters”)
CMF Technology Applications

Applications: Solids or precipitant removal
- Effluent TSS polishing
- Reuse or membrane pretreatment
- Phosphorus removal
- Others

Applied in new or retrofit applications in frame/concrete tank or package/steel tank units.

Benefits of high flux rates in small process footprints at reasonable headloss.
CMF Geometries Available

- Vertical disc is most common and standard offering from technology manufacturers
- Maximum number of disc modules per unit varies with flow direction
- Disc surface area variable
- One manufacturer offers other geometries:
  - Drum
  - Diamond lateral
CMF Flow Direction Options

- Two influent flow directions available in the industry
  - Inside – Outside
  - Outside – Inside

- Flow direction choice primarily affects:
  - Method of solids removal via backwash/reject
  - Submerged or active filter area
  - Type of cloth media and active filter depth
CMF Flow Direction Options: Outside - Inside

- **Configuration**
  - Individual vertical discs. Common or individual disc filtrate/effluent collection.
  - Installed in pairs. 2 – 12 discs/unit.

- **Submergence**
  - Completely, thus 100% active filter area in the influent water

- **Cloth**
  - Fiber pile, 10 micron (nominal)

- **Active filter depth** - 3-5 mm

- **Clarifier or settling tank capacity** - Yes.
Solids removal
- Settled – by pump
- Cloth – by vacuum pumps and stationary vacuum bar. Disc rotates.

Reject/Backwash
- Water source – Filtrate (effluent)
- Quantity - 1 to 3% of applied flow
- Triggered on level sensor and/or timer (or manual)
- Filtration is active as only a small portion of media area is backwashed during cycle.
CMF Flow Direction Options: Inside – Outside

- **Configuration**
  - Panels connected to central feed drum for disc.
  - Installed with up to 24 discs/unit.

- **Submergence**
  - Typically ~65%, thus ~65% active filter area in the filtrate (effluent).

- **Cloth**
  - Woven, 10 micron (absolute)

- **Active filter depth - NA**

- **Clarifier or settling tank capacity - NA.**
Solids removal
- Cloth – by pressure wash using spray nozzles and wash water pump. Disc rotates and previously non-submerged area active.

Reject/Backwash
- Water source – Filtrate (effluent)
- Quantity – 0.5 to 3% of applied flow
- Triggered on level sensor and/or timer (or manual)
- Filtration is active as only a small portion of media area is backwashed during cycle.
Cloth: Pile and Woven

Pile

Carrier Fabric

Pile Filaments

Woven
Selected Manufacturers

- Aqua-Aerobics Systems, Inc.
  • AquaDisk®, AquaDiamond®
- Parkson Corporation
  • DynaDisc® Filter
- Siemens Water Technologies
  • Forty-X™ Disc Filter
- Veolia Water Solutions and Technologies – Kruger Inc.
  • Hydrotech Disc Filter
Aqua-Aerobics Systems, Inc
AquaDiamond®

- Flow Direction: Outside – Inside
- Cloth: Pile
Aqua-Aerobics Systems, Inc
AquaDisk®

- Flow Direction: Outside – Inside
- Cloth: Pile
Parkson Corporation
DynaDisc® Filter

- Flow Direction: Outside – Inside
- Cloth: Pile
Siemens Water Technologies
Forty-X™ Disc Filter

- Flow Direction: Inside – Outside
- Cloth: Woven
Veolia WS &T – Kruger Inc. - Hydrotech Disc Filter

- Flow Direction: Inside – Outside
- Cloth: Woven
Project Application – 30 MGD peak retrofit

- Application:
  - Tertiary filtration, effluent polishing

- Design criteria
  - Conceptual/PER level
  - Retrofit within existing 1971 era Microscreen Building (10 mgd Avg, 15 mgd Peak)
  - Criteria:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Peak</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (MGD)</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Influent TSS (mg/L)</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Effluent TSS (mg/L)</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Existing Microscreens

- (5) units, 10ft diameter
Table summary of frame/concrete tank CMF units that met that fit in the retrofit area and had Peak Q >= 30 MGD.

<table>
<thead>
<tr>
<th>Description</th>
<th># of Units</th>
<th># of Filter Disks per Unit</th>
<th>Peak Hydraulic Loading Rate (gpm/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqua-Aerobic Systems, Inc. AquaDisk Filter</td>
<td>5</td>
<td>12</td>
<td>6.5</td>
</tr>
<tr>
<td>Parkson Corporation - DynaDisc Filter¹</td>
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<td>12</td>
<td>6</td>
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<tr>
<td>Veolia Water - Kruger Inc. Hydrotech DiscFilter</td>
<td>5</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Siemens Water Technologies - Forty-X Disc Filter¹</td>
<td>5</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>
Summary

- Overview of Cloth Media Filter (CMF) Technology
  - Flow direction types
  - Technology differences.
- Four manufacturers mentioned (others)
- Selection for the 30 MGD retrofit has not been made at this time.
Questions

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