Disk Filters for Tertiary Filtration in Municipal and Industrial Applications

By

Rich Stummer
Daman Superior LLC
Agenda

• What is a Disk Filter
• Applications for Disk Filters
• Types of Disk Filters
• Advantages of Disk Filters
• Operation of Disk Filters
• Specific Design Features
• Case Studies
• Questions
Aqua-Disk

- cutaway
Kruger Hydrotech
Inside - Out
Influent Weir

12” ΔP (backwash initiation)

Normal Water Level (after backwash)
Applications

• Total Suspended Solids (TSS) Removal
• Phosphorous Removal
• Surface Water Treatment
• Water Reuse – Irrigation, golf course & greenhouse watering
• Industrial Polishing – treating mine effluents, industrial river water use, boiler water
• Pretreatment for Membranes
Types of Disk Filter

• Inside – Out
  – Influent flows from inside Disk to outside

• Outside – In
  – Influent flows from outside to inside Disk

• Filter material
  – Cloth
  – Stainless Steel Mesh
Disk Flow Illustration

Outside-In Design

- Water Fills the Basin

- Influent Water Flows through the Cloth and Clean Effluent is gathered on the Interior of the 4” thick Filter Disk

- Clean Water Rises up through the “Throat” of the Disk, and Exits the Disk through the Effluent Pipe at the top that is connected to the Effluent Trough
Advantages of Disk Filter

- Flexible – applications requiring removal of colloidal & suspended solids
- Small footprint to flow ratio
- Easily expanded
- Ultra low backwash rates (typically <1%)
- Uninterrupted flow during backwash
- High quality filtrate
- High solids/hydraulic loading capacities
Disk Filter

- Cloth Media Membrane or Stainless Steel Membrane
- Tank – concrete, steel, fiberglass
- Pumps – backwash & solids capture
- Drive motor for disk or suction shoe
- Gravity flow through disk filter to effluent channel
Disk Filter

- Solids collection by vacuum
- Solids collection in bottom of tank
- Solids removed by backwash pumps
- Effluent used for backwash
- Backwash pumps can handle 2” solids
Five Star Disk Filter Features

- No Rotating Seals
- Highest Quality Filtrate
- Easy Disk Removal while System is Operational
- Filtrate Discharge Point for Each Disk
- Title 22 Approved
- Un-interrupted Flow during Backwash Cycle
- Low Backwash Rate (typically <1%)
- Low Headloss (minimum 12”)
- High Solids and Hydraulic Loading Capacities
Typically Receives Flow from Secondary Clarifiers

Five Star Disk Filter is a Tertiary Filter designed to:
   Remove Suspended and Colloidal Solids
   Reduce Phosphorus with Chemical Addition
   Produce “High Quality – Reuse Water”

System Operates Automatically with Virtually “NO” Operator Attention Requirements

PLC communicates with SCADA

Operates in “Static Mode” with NO Moving Parts 97% of the Time

System Minimizes Backwash Flow – Typically <1% of Influent
Five Star Cloth

- Yellow, Jersey Fabric
- 20% Acrylic/80% Polyester Face
- 100% Polyester Backing Yarn
- Acrylic Latex Back Coating
- 12/32” Finished Pile Height
- Cloth 1A - 37.5 oz Per Linear Yard  
  CA Title 22  Approved @ 12.75 gpm/ft$^2$
- Cloth 2A – 68 oz. Per Linear Yard  
  CA Title 22  Approved @ 10.35 gpm/ft$^2$
California Title 22 Certifications

2008

• Five Star received Title 22 ACCEPTANCE @ 6 gpm/ft² (Cloth 1A)

2011

• Five Star received Title 22 ACCEPTANCE:
  Cloth 1A: 12.75 gpm/ft²
  Cloth 2A: 10.35 gpm/ft²
EASY AS 1-2-3
Disk Isolation & Removal

1. Close the Knife Gate Valve in the Effluent Trough.
2. Slide the Fernco Coupling onto the Filtrate Pipe on the Disk.
3. Remove a Disk utilizing the Lifting Eye on the Filtrate Pipe.
Cloth Replacement
Five Star Filtration
Pilot/Demo Unit  Model 2D36DA
Pilot Utility Requirements

• Power: 460 Volts, 25 amps, 60 cycle/3 phase plus ground (50’ electrical cable on board)
• OR 230 Volts, 50 amps, 60 cycle/single phase (50' electrical cable onboard)
• Influent: 3" (PVC furnished w/all connections)
• Effluent: Four inch (4”) quick-disconnect w/20 ft. hose.
• Backwash: Two inch (2”) quick disconnect coupling w/ 50 ft. hose.
Pilot Connections
Pilot Control Panel
Pilot Pumps & Connections
Komoka, CN WWTP (Expansion)
Komoka, Ontario, CN
Komoka, CN WWTP (Expansion)
Komoka, Ontario, CN
Pecan WRP
Queen Creek, AZ
Questions?

• Daman Superior Booth – additional information and questions

• Thank You