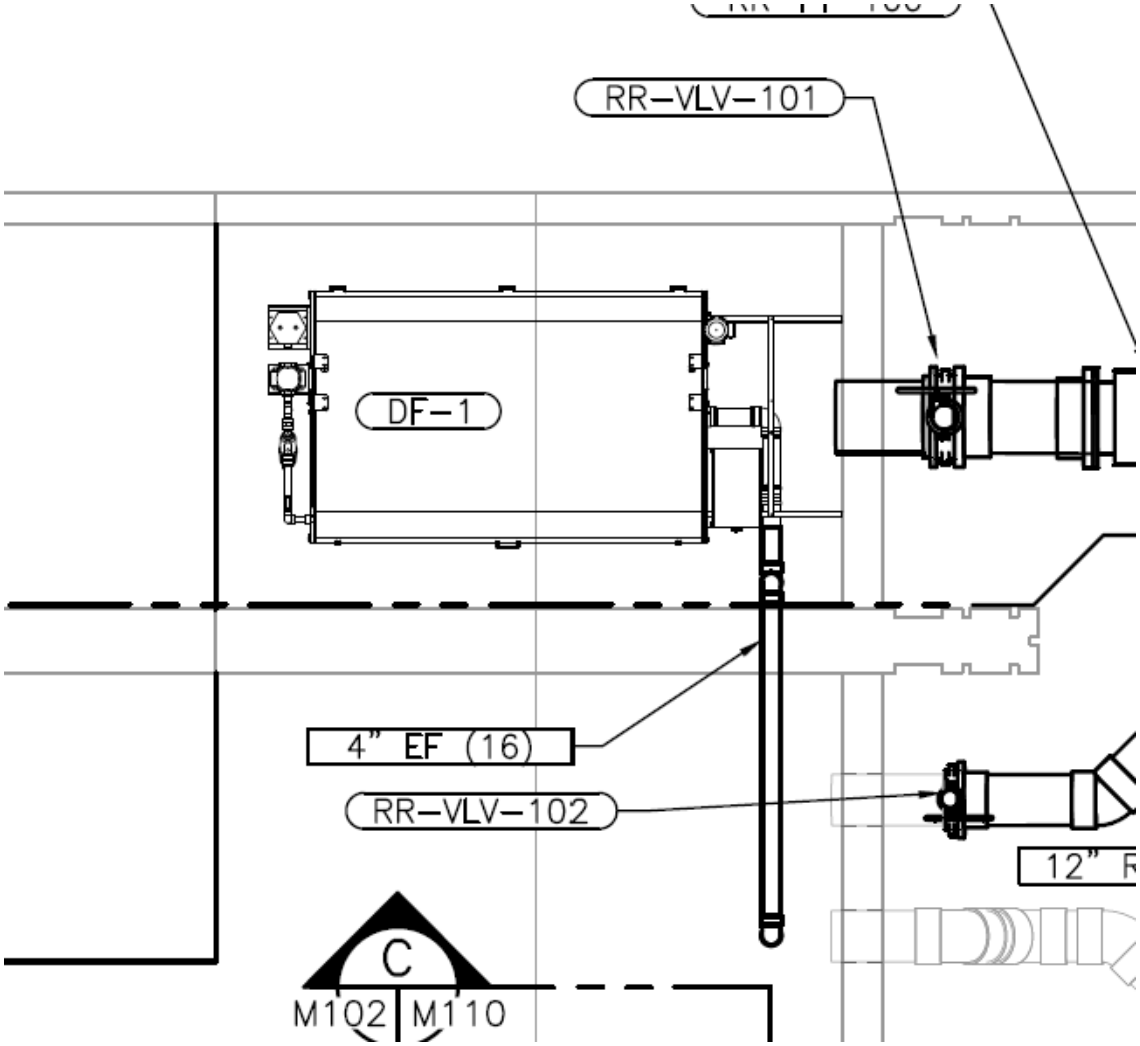

2.02 MICROSCREEN DRUM FILTERS (MSDF)

A. PTS DRUM FILTER (DF-1)

1. Reuse Return (RR): RR shall be gravity fed to the microscreen drum filter. Upon entering the drum, the flow disperses radially as it moves through the woven polyester screen panels mounted to the periphery of the drum frame.

2. Operating Liquid Levels: The influent hydrostatic head shall be sufficient to overcome head-loss within the microscreen filter and ensure gravity flow through the microscreen filter. Influent flow shall enter the inside of the drum where the water level shall vary between the minimum allowable water level and a maximum water level as set by an internal bypass weir. The fluctuating water level inside the drum is caused by the increased head-loss as particles to be

filtered collect on the screen panels. A constant water level shall be maintained around the filter drum using an internal weir prior to exiting the filter vessel. The microscreen filter shall be operated at minimum submergence of 40 percent of its filtering surface area.

3. Backwash Cycle: Cycle: When the differential water level between the inside of the drum and the filter enclosure reaches a pre-set limit, a level switch shall initiate the backwash cycle. After the switch is activated, the drum drive shall rotate the drum 2 to 2½ rotations, which is controlled by a timer in the control panel. As the drum rotates, the backwash pump shall operate to convey high-pressure filtered process water to the spray bar and spray nozzles located above the drum screens. To withdraw filtered process water, the inlet of the backwash pump shall draw from the filter enclosure. As backwash water passes through the screens, it is collected in a solid's trough located directly under the spray bar inside the drum. The collected solids water is conveyed out of the drum by the inclined trough to discharge by gravity.

B. Operating Conditions: Conform to the following operating conditions:

Drum Filter not to exceed 7 ft wide. Must operate in an 8ft wide channel

Module	**DF-1**
Quantity	One (1)
Model Type	Frame
Design flow rate (USGPM)	2100
Design Influent TSS (mg/L)	10
Screen Pore Size	40 microns
Minimum Drum Submergence	40% of filtering surface area
Maximum screen hydraulic loss	12 in
Inlet Size	18 in/Flanged

C. Equipment Requirements:

1. Support Frame:

   a. Each microscreen drum filter shall have a structural welded 304 stainless steel frame that provides support for the rotating drum assembly and all mechanical components.

   b. The support frame shall include an integral sump for control of the filter water level downstream of the micro-screen panels.

   c. Bypass: The rotary microscreen drum filter frame must be equipped with a bypass such that if the input flow exceeds the filter capacity, excess water will overflow from the inlet side of the filter to the outlet side of the filter, bypassing the filter panels.

   d. Include support frame leg extensions as needed to provide for water surface operating levels shown on the Drawings.

2. Filter Cover

   a. The filter shall be furnished with a cover constructed of fiberglass (FRP) with a hinged access panel for access to the spray-bar. The cover must also be removable to facilitate maintenance.

3. Drive Train Assembly:

   a. The drive axle shall be constructed of 316 stainless steel and shall have a keyed shaft. The axle shall be coupled to an FRP plate forming the closed end of the drum assembly. The FRP plate shall be capable of absorbing flexure due to normal wear of drum support wheels.

   b. Ensure that there is no risk of lubricants or grease directly contacting the process water or dripping into the process water.

   c. Frame Models shall have a sealed mechanical gear reducer mounted to a drive tower. The drive shaft shall be driven by a lubricated chain and supported by self-aligning pillow block bearings.

   d. The mechanical gear reducer shall be coupled to a high efficiency, TEFC electric motor.

4. Screen Media:

   a. Screen media is to be woven polyester fabric with a nominal screen contained within and supported by a molded injected polypropylene grid. Screen media shall be furnished in complete pre-formed panels that can be individually installed, repaired or replaced. Individual cells of the media panel grid must be designed to allow the use of patching plug(s), as furnished by the manufacturer, for repair of minor damage to filter plates.

   b. Screen panels, when mounted on the drum filter, shall be capable of withstanding a maximum continuous head-loss of twelve (12)-inches of water.

   c. Each screen panel shall be sealed continuously on all edges with a silicon sponge gasket, attached to the drum frame with 304 stainless steel anchoring assemblies.

d. Replacement of the filter media must be possible from outside the filter tank. Individual panel removal shall be achievable without removal or disengagement of more than one additional panel.

5. Rotating Drum:

a. The rotating drum shall be fabricated from structural welded, 304 stainless steel and shall be open at one end to allow the influent to enter. The drum assembly shall be sealed sufficiently to prevent bypassing of influent flow into the filtered water tank except in a bypass condition.

6. Drum Seal:

a. The drum seal is to consist of a synthetic elastomer seal wear ring integrally assembled to the front face of the drum filter enclosure or support frame. The seal shall be formed to maintain continuous contact with the surface of the open end of the rotating drum assembly.

7. Backwash System:

a. Each filter shall be supplied with a backwash system comprised of a backwash spray bar assembly, a backwash collection trough, and a backwash pump. The backwash system must operate automatically based on high differential water level between the inside of the drum and the outside of the drum.

b. The backwash collection trough must be located to allow the rotating drum to achieve a bypass condition without influent overflowing into the waste trough. The trough shall discharge by gravity.

c. Backwash spray bar assembly is to consist of a stationary spray header, oriented along the length of the drum assembly, on which are mounted a series of spray nozzles. The spray nozzles shall be sufficient in quantity and shall be spaced appropriately to ensure full spray coverage of the drum length. Spray nozzles shall be of quick-disconnect design to allow for cleaning without turning the spray bar off. The spray nozzle shall consist of a nozzle tip made of 303 SS stainless steel, mounting cap for quick removal, nozzle body and seals. The replacement or cleaning of nozzles must be possible from outside of the filter enclosure.

d. The backwash pump shall be of the horizontal multi-stage design with the motor mounted directly to the pump. The pump shall be capable of supplying the required backwash flow, as specified by the Manufacturer, at a pressure of 100 psi. The motor shall be Totally Enclosed Fan Cooled (TEFC). The pump and backwash piping system shall be configured for year-round outdoor service in conjunction with heat trace and insulation as needed to prevent freezing.

e. Filtered effluent shall be used as the backwash water source. A valve and pressure gauge assembly shall be installed on the backwash spray header piping downstream of the pump in order to regulate to the desired nozzle pressure. The backwash system shall be plumbed with PVC or stainless-steel piping supplied and installed by the Contractor.

8. Control Panel:

a. Each microscreen filter shall have a local control panel which shall house the automatic level control circuit and motor controls. The panel will have a lockable NEMA-4X enclosure. The circuit shall be UL approved. The circuit shall be capable of closing and opening the motor contacts for the drive motor, and the backwash pump motor. The circuitry for the level switch shall be operated at low voltage.

b. The control panel shall activate the motors for operation when the backwash cycle is initiated. Each of the motors shall have a hand-off-auto (HOA) selector switch and run indication pilot lights on the panel door.

1) "Hand" Operation - When the HOA selector switch is in "hand" or "manual" mode, the drum drive and backwash pump shall operate continuously without any interlocking logic.

2) "Auto" Operation - When the HOA selector switch is in "auto" or "automatic" mode, the level switch shall control the operation of the drum drive and backwash pump.

c. The control panel shall include a VFD or soft start circuitry to ensure the smooth, controlled starting of the filter motor on initiation of the backwash cycle, preventing damaging the filter or electrical components due to high initial torque and current draw.

d. In addition to the Backwash cycle level switch, a High-level alarm switch is also included with the filter. When triggered, the High-level switch will be able to activate a visual or audible alarm. Level switch is a single-point magnetic reed switch constructed from 316 SS.

D. Equipment Construction: Construction shall be as follows:

Filter enclosure (FRP Tank models)	NA
Filter support frame (Frame models)	304 Stainless Steel
Filter Drum, Screen Clamps, Drive Structure	304 Stainless Steel
Filter Element	Polyester fabric on polypropylene grid with silicone sponge gasket
Drum Seal	EPDM
Drive Motor	TEFC , 480 V 3PH 60 Hz
Drive Shaft	316 Stainless Steel
Backwash Pump	TEFC , 480 V 3PH 60 Hz

Control Panel	NEMA 4X, UL
Lubrication	Food safe mineral oil and grease

E. Manufacturers, or Equal

1. Hydrotech
2. Integrated Aqua Systems, Inc.
3. Innovasea