

## AUTOMATIC SCREEN FILTERS

### A. Automatic Screen Filters, Electric:

1. Manufacturers: Subject to compliance with requirements, provide products by **Omicron Water Technologies. (www.omicronwater.com)**
2. Basis-of-Design Product: Provide **Omicron Twin 5300-18(V) 316L**.  
Total screen area: **10,600 cm<sup>2</sup>**
3. Description: NSF/ANSI 61 and 372 certified automatic electric filter(s) manufactured and tested by Sistemas de Filtrado y Tratamiento de Fluidos, S.A. (STF) in Monzon, Spain. Each filter provided with weave wire screen rated at 18 micron and accordingly providing near total reduction of total suspended solids (TSS) above 18 microns, and additional reduction of TSS smaller than 18 microns as is characteristic of screen filtration technology in municipal water conditions. With 4-inch inlet and outlet, 150# raised face flange connections.
4. Operation Description: The water enters the stainless steel fine filter element inside out, allowing particles to accumulate on the inside surface of the element. A Differential Pressure Switch (DPS) senses the pressure differential across the filter as filter cake builds up on the element. The DPS shall signal the PLC control panel to initiate the cleaning cycle of the filter when the filter cake causes a pressure differential of 0.3 bar (4.4 psi), visible on the PD display. PD set point shall be user adjustable via the HMI touchscreen. During the flushing cycle, there shall be no interruption of flow. With a clean screen at the maximum flow rate, the filter shall lose less than 1 psi. The filter operation and flushing shall be controlled and monitored by a touchscreen PLC control panel. The panel, and its related circuitry, shall be housed in a NEMA 4X-rated enclosure. A single point power connection controls operation.
5. Cleaning Mechanism: The filter cleaning mechanism shall consist of a spiral-moving suction scanner, constructed of a 316 stainless steel assembly. By opening a 1" flush valve, the scanner shall create high efficiency suction force on each of the 4 cleaning nozzles. During that time, the nylon brush nozzles shall clean the total area of the screen. The nozzle head shall contact the screen surface at a constant pressure in order to maximize cleaning efficiency. At 45 psi, the flushing flow rate shall not exceed 90 gallons per minute.
6. Assuring a maximum flush flow rate of 90 gpm, regardless of pressure, shall be enabled by a flow control valve in the drain line. The cleaning cycle shall be completed in 25 seconds or less, consuming approximately 38 gallons. The minimum pressure required for flushing shall be 45 psi during the flush cycle.
7. Driving Mechanism: The suction scanner shall be driven by a 0.5 hp (0.37 kW) electric motor that is connected to the suction scanner through a threaded shaft that travels inside a threaded bearing. The movement created by the electric motor shall cause the scanner to move in a spiral motion at a speed of 17 RPM (@208V AC 60 Hz). The control of the scanner by the electric motor shall be limited by two normally closed limit switches and monitored by the control panel.
8. Filtration Element: The filter element shall be of a patented construction of a combination of wedge and weave wire screens, consisting of four layers, fabricated

together to achieve both greater open area and mechanical strength. The collective screen shall be made of 316L stainless steel. The screen's external support shall be constructed of wedge-wire. The fine weaved-wire screen shall be sandwiched (protected) between two 2000-micron weaved-wire additional layers. The total surface area of each screen shall be 5300 cm<sup>2</sup> (825 in<sup>2</sup>) and shall be able to withstand an internal to external pressure differential of 100 PSI without any damage.

9. Housing Construction: The filter housing shall be of 316L stainless steel. The filter body shall have a maximum operating pressure of 150 PSI (PN10), and a maximum operating temperature of 120° F. The filter housing shall have the capability to accept filter elements of varying micron degrees, which are totally interchangeable in the same housing.
10. Control System: The filter control system shall consist of a NEMA4 PLC with HMI that controls all aspects of the filter's operation including monitoring the DPS and limit switches, and operating the flush valve, electrically actuated bypass valves, failsafe actuator, electric motor and flush line pump (if included). The control panel shall include a flush counter to monitor average flush intervals. Control features shall include dry contact outputs to remotely indicate flush in progress and fault situations, and inputs to remotely initiate a start or stop of the filtration system. The filter shall conform to international quality code ISO-14001.
11. Meets or exceeds all current US domestic quality requirements for filtration devices including, but not limited to, NSF Standard 61, ANSI, AWWA, ASE, and others.
12. Construction: Filter components are integrated onto single skid that may be bolted to floor to resist filter movement during a seismic event.
13. Motor: General requirements for motors are specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."
14. Controls: Automatic for control of flush cycles and backwash; factory wired for single, external electrical connection.
15. Support: Skid mounting.

#### CAPACITY AND CHARACTERISTICS:

- a. Filter Design: Continuous Flow: <300 gpm at up to 150 psi with pressure drop from 1 psi with clean screen up to 4.4 psi upon which backwash of screen is triggered. (See operations.)
- b. Pump Motor Size and Electrical Characteristics:
  - Brand: Siemens
  - Model: 1LA7073-4AB91-Z L1Y
  - Rated Voltage: 208 V [or 460V]
  - Frequency: 60 Hz
  - Power: 0.43 kW
  - Insulation: 155(F) to 130(B)
  - Duty Type: S1
  - Material of terminal box: Aluminum
  - Protection Degree- IP55
  - Cable entry: M25x1.5 + M16x1.5

- c. Electricity and Control:
- Control Voltage: 24 V DC
  - Power: 0.43 kW
  - Operation Voltage: 208 V [or 460V] / 60 Hz / 3 ph
  - Consumption: 2.39 A
  - Power: 0.43 kW
  - Torque: 11 Nm
  - Hazardous Area: None

## FILTER OPERATION DETAILS

The filter is comprised of a housing with two separate chambers within. The first chamber, with the filtration screen, connects to the water inlet port; the second is the backwashing chamber.

Water circulates through the body of the filter from the inside out. The collected solids in suspension are retained within the filtering component (the screen). This chamber connects to the filtered water outlet to supply the intended operation: potable water, process water, cooling tower water, etc.

The outlet of the backwashing chamber is connected to the drainage valve that enables rinse water run off, once the self-cleaning process has been initiated. The backwashing chamber is otherwise sealed from the filtration chamber.

The suction scanner is located on the central axis of the filtration element, and is hydraulically connected to the backwashing chamber. The scanner's suction nozzles terminate in nylon bristles that extend to within a few microns of the screen mesh. Nozzle positioning is calibrated to effect contact with the entire inner surface of the mesh as a consequence of the motorized spiral motion of the scanner, combining longitudinal motion with rotation.

## OPERATION SUMMARY

- The water enters the filtration chamber and passes through the fine screen to produce surface mechanical filtration at the filtration degree according to the selected screen rating, from 10 to 2000 microns.
- As the collected particles accumulate on the inner surface of the fine mesh, their build-up causes a progressive loss of pressure between the filter inlet and outlet. When the differential pressure reaches 0.3 bar (4.4 psi), two analog transducers initiate the backwashing sequence. Other backwash methods are available, including time delay, combined pressure and time delay, or continuous backwashing.
- When the differential pressure switch reaches 0.3 bar (4.4 psi), the drainage valve is signaled to open. This generates a pressure differential between outside (atmospheric pressure) and inside the filter (working pressure), which induces a current of fast-flowing water that rushes through the mesh and out through the inner hole of the suction scanner nozzles. At this point a signal is sent to the motor to start operating.
- The result of simultaneous spiral movement of the suction scanner inside the filter, and the suction effect from the nozzles on the accumulated filter cake, enables successful cleaning of the fine screen.

- During the 25-second self-cleaning process, filtered water continues to flow without interruption to the intended application.