

## SECTION 15075

### AUTOMATIC STRAINER

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

###### A. Scope

1. Furnish and install one (1) automatic, self-cleaning strainer system to strain or screen plant effluent upstream of the nonpotable water packaged pump station
2. Automatic self-cleaning strainer system shall be furnished complete with strainer housing, strainer element, internal backwash assembly, electric motor, gear reducer, electrically actuated backwash valve, backwash assist pump, control panel, motor starters, differential pressure switch and all other instruments, devices, appurtenances and accessories as specified herein and as required for complete and proper installation and operation

###### B. Additional Requirements Specified Elsewhere

1. Section 01340: Shop Drawings, Product Data and Samples
2. Section 01400: Quality Control
3. Section 01600: Materials and Equipment
4. Section 01730: Operating and Maintenance Data

###### C. Related Requirements Specified Elsewhere

1. Section 02615: Ductile Iron Pipe
2. Section 02622: Plastic Pipe
3. Section 02641: Valves and Accessories
4. Section 03600: Grout
5. Section 05501: Anchor Bolts and Drilled-In Anchors
6. Section 09900: Painting
7. Section 11211: Packaged Pump Station
8. Section 15060: Pipe and Pipe Fittings

##### 1.2 QUALITY ASSURANCE

###### A. Design Basis

1. Eaton Corporation, Model 2596 Automatic Self-Cleaning Strainer
2. Equivalent products of other manufacturers may be accepted subject to compliance with design, function, materials and performance of the specified items

##### 1.3 SUBMITTALS

###### A. In accordance with Section 01340

## B. Shop Drawings and Product Data

1. Sufficient data to verify compliance with these specifications and to illustrate construction and assembly of the products
2. Complete fabrication, assembly, foundation and installation drawings and installation instructions
3. Detailed specifications and data describing all materials, parts, devices and accessories utilized in the complete automatic strainer system, including control panel and other control devices
4. Strainer
  - a. Manufacturer
  - b. Type and model
  - c. Materials of construction
  - d. Equipment components and accessories
  - e. Size of inlet and outlet
  - f. Headloss data
  - g. Complete dimensions
  - h. Anchor bolt layout and size
  - i. Net weight of assembly
  - j. Complete description of operation
  - k. Shop painting data
5. Motor
  - a. Manufacturer
  - b. Type and model including insulation class
  - c. Rated size (hp)
  - d. Temperature rating and service factor
  - e. Dimensions
  - f. Weights
  - g. Design voltage and current draws
6. Drive
  - a. Manufacturer
  - b. Type and model
  - c. Input and output speeds
  - d. Speed ratios
  - e. Service factor (24-hour continuous service)
  - f. Torque rating
  - g. Bearing type and life
7. Backwash assist pump
  - a. Manufacturer
  - b. Type and model
  - c. Rated speed
  - d. Size and type of nozzle connections
  - e. Complete performance curves
    - 1) Capacity versus head
    - 2) NPSH required
    - 3) Brake horsepower
  - f. Dimensions

C. Certification of Compliance

1. Manufacturer's affidavit of compliance certifying
  - a. All equipment and materials comply with these specifications with any exceptions noted
  - b. Equipment has been properly installed and is operating within specification tolerances
  - c. All tests have been performed with satisfactory results

D. Operating and Maintenance Manuals in accordance with Section 01730

1.4 JOB CONDITIONS

- A. Indoor installation in NPW Room of the Pumping and Disinfection Building
- B. Process Fluid: Wastewater treatment facility final effluent
- C. Automatic strainer is gravity fed from effluent channel and is upstream of the nonpotable water system pumps
- D. Refer to Drawings for pertinent dimensions and elevations

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

A. Hydraulic Requirements

1. Inlet pressure range: 0 to 10 psi
2. Maximum pressure loss through a clean screen: 0.5 psig
3. Maximum flow rate: 300 gallons per minute
4. Screen opening size: 1/32"
5. Pipeline size: 6 inch
6. Connections: 125 lb. flange

B. General Requirements

1. Designed for uninterrupted flow
2. Automated cleaning cycle with provision for manual initiation of cleaning cycle
3. Integral mounting base and/or feet
4. Minimum 1/4" vent tap in housing
5. Minimum 3/4" drain tap in housing
6. Provide minimum 1/4" taps for differential pressure switch along with gauge cocks and pressure gauges on inlet and outlet connections
7. Minimum 1 1/2" backwash connection
8. Elastomers: EPDM

C. Housing

1. Cast iron or ductile iron
2. Rated for minimum 150 psi

3. Designed and constructed in accordance with ASME standards

D. Screen Element

1. Stainless steel
2. Non-clogging design
3. One-piece wedge-wire construction
4. Provide cap rings on each end to prevent bypass during operation
5. Provide vane plate at inlet of screen element to promote circular flow pattern and reduce screen blockage

E. Motor

1. 480 VAC or 120 VAC, refer to control panel requirements
2. High efficiency
3. Enclosure: TEFC or TENV
4. Continuous duty
5. Service factor: 1.15
6. Maximum nameplate horsepower:  $\frac{1}{2}$

F. Drive

1. Gear reducer
2. Heavy duty construction
3. Cast iron housing
4. Hardened steel gears machined for high quality
5. Maximum output speed to backwash assembly: 5 rpm

G. Backwash Assembly

1. Designed to reverse flow through a portion of the screen element to clean/remove debris
2. Utilize screened process water for backwash fluid
3. Backwash arm to rotate around inside of screen element with adjustable port shoe in close proximity to screen face
4. Hollow, full flow backwash arm to extend the full length of screen element
5. Constructed to allow complete assembly to be lifted out of housing as a single unit for ease of maintenance

H. Backwash Assist Pump

1. Provided and sized by strainer manufacturer for proper operation under given job conditions
2. End suction centrifugal pump
3. Minimum flow during backwash operation: 30 gpm, unless otherwise recommended by strainer manufacturer
4. Minimum nozzle sizes: 1"
5. Refer to Drawings for pump piping requirements
6. Minimum sphere size to pass:  $\frac{1}{2}$ "
7. Motor
  - a. 480 VAC or 120 VAC, refer to control panel requirements

- b. Maximum nameplate horsepower: 2
- c. Enclosure: TEFC or TENV
- d. Design speed: 3,600 rpm

#### I. Control System

1. Provide one (1) local control panel for operation and control of the complete automatic, self-cleaning strainer system, including the backwash assist pump
2. Local control panel to be mounted in NPW Room per Drawings
3. Automatic intermittent backwash cleaning cycles are initiated by adjustable timers in the control panel
4. An adjustable differential pressure switch (inlet to outlet) can override the timers and initiate a backwash cleaning cycle at any time
5. Continuous backwash cleaning mode shall be provided
6. Backwash assembly shall be capable of manual operation
7. Solenoid operated ball valve shall be provided on the backwash connection of the strainer
8. Initiation of a backwash cleaning cycle shall energize the strainer drive motor, backwash assist pump and solenoid operated backwash valve
9. Control panel
  - a. Number required: 1
  - b. Enclosure rating: NEMA 4
  - c. Control panel component rating: NEMA 4
  - d. Complete prewired and factory tested prior to shipment
  - e. Main disconnect switch capable of being locked in the Off position
  - f. Accept input power of 480 VAC, 3-phase, 60 Hz
    - 1) Manufacturer has the option of provide the strainer drive motor and backwash assist pump motor in either 480 VAC, 3-phase, 60 Hz or 120 VAC, single-phase, 60 Hz configuration to minimize the size and component requirements of the control panel
  - g. Include the following minimum electrical devices
    - 1) FVNR motor starter and motor overload protection for both the strainer drive motor and the backwash assist pump motor
    - 2) Transformer for 120 VAC control system power
    - 3) Main circuit breaker
  - h. Include the following minimum pilot and control devices
    - 1) Hand/Off/Auto selection switch
      - a) When in Hand, backwash cycle to operate continuously
      - b) When in Auto, backwash cycle to operate as follows
        - (1) Backwash cycle initiated by a frequency of run timer and continues to operate according to a run duration timer
        - (2) Backwash cycle initiated by a differential pressure switch and continues to operate according to a secondary delay timer. This operation overrides the timed cycle operation without affecting any of those timers
    - 2) Emergency stop pushbutton
    - 3) Power indicating light: White
    - 4) Backwash cycle run indicating light: Green
    - 5) Differential pressure indicating light: Amber
    - 6) Fault indicating light: Red
    - 7) Hour meter/run time meter for both motors

- 8) Solid state frequency of run timer with a minimum adjustable range of 10 to 30 minutes
- 9) Solid state run duration timer with a minimum adjustable range of 2 to 10 minutes
- 10) Differential pressure switch with a minimum adjustable range of 1.0 to 5.0 psig
- 11) Solid state secondary delay timer with a minimum adjustable range of 1.0 to 2.0 minutes
- 12) Fault output contact to SCADA system
- i. Provide circuitry and devices to shut down the equipment upon the following conditions
  - 1) Motor overload/fault
  - 2) Control panel emergency stop pushbutton activation
- j. Clearly label all front panel mounted items and devices on the outside front of the panel
- k. Clearly label all wires and terminal points inside the control panel
- l. All power and control wiring shall be 600 Volt insulated copper and sized for the required load, 14 AWG minimum
- m. All circuit breakers shall be thermal magnetic molded case units
- n. All selector switches, pushbuttons and pilot lights shall be heavy-duty, water/oil tight, corrosion resistant units rated for NEMA 4 service
- o. All terminal blocks shall be pressure connector type with marking strips and covers suitable for copper connectors sized for the application
- p. All control relays shall be industrial plug in type rated for the appropriate application load

#### J. Accessories

1. Provide minimum of 15 feet of 1" hose with appropriate connections for routing backwash water to floor drain if backwash assist pump is out of service
2. Provide extended shaft on backwash arm assembly for manual operation
3. Manufacturer to specify type, size and quantity of anchor bolts required
  - a. Refer to Section 05501 for general requirements
  - b. Manufacturer to provide anchor bolt template to Contractor for coordination on the fabricated steel strainer stand

#### K. Spare Parts

1. Furnish spare parts as recommended by manufacturer
2. The following spare parts to be furnished as a minimum
  - a. One (1) drive pin
  - b. One (1) cover O-ring
  - c. One (1) lower bushing
  - d. One (1) packing set
  - e. One (1) screen element

#### L. Shop Painting

1. Coat all ferrous metal surfaces of the strainer and accessories, both interior and exterior

2. The manufacturer's standard coatings will be acceptable if they are equivalent to and compatible with the specified field coatings
  - a. Rust inhibitive primer
  - b. Epoxy finish coat
  - c. Refer to Section 01600 and Section 09900

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install all equipment in accordance with manufacturer's instructions and recommendations and as specified herein
  1. Refer to Drawings for required equipment arrangement and connections
- B. Accurately locate anchor bolts, equipment pads and stands
- C. Take special care to maintain proper alignment of all components
- D. Grout equipment base after initial fitting and alignment but before final bolting of connecting piping
- E. Test piping connections for stress after final setting
  1. Loosen connections
  2. If any movement or opening of joints is observed, adjust piping to fit
  3. Eliminate any stress between strainer and pump assemblies and connecting piping
- F. Remove all grease, dirt, excess paint, etc. from equipment surfaces prior to final acceptance
- G. Take precautions, as necessary, to properly protect all equipment from damage
  1. Installed equipment to be protected from further construction operations

END OF SECTION