

SECTION 13301

ELECTROMAGNETIC FLOW METERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Furnish and install electromagnetic flow meter assemblies including flow element and flow transmitter for integral or remote mounting configuration as indicated on the Drawings or as otherwise required
2. Coordination: Coordinate entire instrumentation integration, installation, testing, start-up, operator training and operation and maintenance manuals

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
5. Section 13300: Utility Control System
6. Division 16: Electrical

C. Related Work Specified Elsewhere

1. Section 02615: Ductile Iron Pipe
2. Section 02622: Plastic Pipe
3. Section 02708: Pressure Pipelines and Appurtenances
4. Section 05501: Anchor Bolts and Drilled-In Anchors
5. Section 16050: Basic Electrical Materials and Methods

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. All equipment to be designed and manufactured by a single manufacturer experienced in electromagnetic flow metering devices
 - a. Equipment to be the standard product of the manufacturer with specified optional accessories
 - b. Minimum 5 years experience in the design and manufacture of electromagnetic flow metering equipment of the type specified herein
 - c. Provide list of installations where electromagnetic flow metering equipment of similar size has been in operation for at least 5 years upon request
2. Contractor's responsibilities and coordination
 - a. The Contractor will be responsible for all appropriate coordination between his electrical, instrumentation and controls suppliers and the equipment manufacturers to ensure proper installation of work

b. All Systems shall be complete and functional per the Contract Document

B. Reference Standards

1. ISA: Instrument Society of America

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 assembly
4. Flow meter assemblies
 - a. Manufacturer
 - b. Type and model
 - c. Materials of construction
 - d. Equipment components and accessories
 - e. Size and type of end connections
 - f. Complete dimensions
 - g. Anchor bolt layout and size
 - h. Installation requirements
 - i. Net weight of assembly
 - j. Complete description of operation
 - k. Wiring and control layouts, descriptions and diagrams
 - l. Shop painting

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

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

A. Equipment Interfacing

1. Analog signals to and from equipment by others or under other section: 4-20 mAdc

2. Provide all required buffers, isolators, signal converters, and amplifiers for coordination with power supply, equipment furnished under other section, and between items of equipment furnished hereunder, whether indicated on the Drawings or detailed specifications, or not

B. Power Supply

1. Provide all required power and conversation equipment for operation of all electric and electronic items from a 120 V ac \pm 12 V ac power supply source

C. Magnetic Flowmeters

1. Location: RAS pump discharge piping in Pump Room of Pumping and Disinfection Building
 - a. Quantity: 3
 - b. Service: Return activated sludge from final clarifiers
 - c. Size: 6"
 - d. Flow range: 50 – 1,000 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
2. Location: WAS pump discharge piping in Pump Room of Pumping and Disinfection Building
 - a. Quantity: 3
 - b. Service: Waste activated sludge from final clarifiers
 - c. Size: 4"
 - d. Flow range: 50 – 300 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
3. Location: Digested sludge pump discharge piping in the Pump Room of Pumping and Disinfection Building
 - a. Quantity: 2
 - b. Service: Digested sludge from aerobic digester basin
 - c. Size: 4"
 - d. Flow range: 100 – 400 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
4. Location: Scum pump discharge manifold piping in Pump Room of Pumping and Disinfection Building
 - a. Quantity: 1
 - b. Service: Secondary clarifier scum well contents
 - c. Size: 4"
 - d. Flow range: 50 – 300 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
5. Location: Decant pump discharge manifold piping in Pump Room of Pumping and Disinfection Building
 - a. Quantity: 1
 - b. Service: Aerobic digester decant liquid (supernatant)
 - c. Size: 4"
 - d. Flow range: 100 – 400 gpm

- e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
6. Location: Drain pump discharge manifold piping in Upper Level of Pumping and Disinfection Building
- a. Quantity: 1
 - b. Service: Aeration basin contents
 - c. Size: 6"
 - d. Flow range: 100 – 1,000 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
7. Location: Wastewater pump discharge manifold piping in Upper Level of Pumping and Disinfection Building
- a. Quantity: 1
 - b. Service: Facility drain and domestic wastewater
 - c. Size: 2"
 - d. Flow range: 10 – 100 gpm
 - e. Maximum working pressure: 100 psig
 - f. Flow transmitter mounting: Integral
8. Flow elements
- a. Magnetic flowmeter
 - b. No moving parts in contact with fluid
 - c. Electrodes
 - 1) Flow rate
 - 2) Grounding
 - 3) Empty pipe detection
 - 4) Material: Hastelloy C22 or equal
 - d. Cleanable magnetic flow meter electrodes
 - e. 125 lb. ANSI A21.10 or B16.5 flanged ends to match connecting pipe flanges
 - f. Grounding rings at each end
 - g. Capable of standing empty for extended periods of time without damage
 - h. No constriction in or obstruction of flow through meter
 - i. NEMA 4X enclosure unless otherwise noted
 - j. Encapsulated characterized field coils
 - k. PTFE lined
 - l. 140°F working temperature
9. Flow transmitter
- a. Mounting as indicated on the Drawings or otherwise specified
 - b. NEMA 4X enclosure unless otherwise noted
 - c. All solid state circuitry
 - d. Systems accuracy: $\pm 1.5\%$ of full scale
 - e. Output signal
 - 1) Provide 4-20 mA_{dc} output as required by process and instrumentation equipment
 - f. Flow rate indicator and totalizer visible without opening enclosure
 - g. Self contained zero return which sets flow meter output to zero when flow through meter is minimal
 - h. Meter zero verifiable without stopping flow
 - i. Power supply: 120 VAC, 60 Hz, single phase
 - j. Capable of retaining system data on power failure

- k. Provide all necessary cables and connections between magnetic flow meter and related signal devices and equipment
- 10. Design basis
 - a. Badger Meter M-2000 series
 - b. Rosemount 8700 Series
 - c. Endress & Hauser ProMag series

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all products per manufacturer's recommendations and the Drawings
 - 1. Instrumentation supplier to provide a complete and functioning system
 - a. Functional descriptions are intended to show the basic functional requirements of the control loops and systems and do not relieve the instrumentation supplier from the responsibility of providing a complete and functioning system
 - 2. Provide signal converters and boosters as required
- B. Accessory Equipment
 - 1. Provide prefabricated steel or ductile iron spool pieces for insertion in place of magnetic flow meters to facilitate testing and operational status prior to delivery of instrumentation and future removal of instrumentation while maintaining process operation
 - a. Spool pieces shall be furnished with end treatment matching flow meters
 - b. Coating of spool pieces shall match adjacent piping for surface preparation, coating material and application requirements
- C. Furnish and install pipe supports and foundation elements as shown on the Drawings and as recommended by the manufacturer

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services
 - 1. During installation
 - a. Advise Contractor on installation
 - b. Check, calibrate, and place equipment in operation
 - c. Visit the job as often as required and spend as much time as necessary to ensure compliance with specification
 - d. Demonstrate operation of each instrument and system to Owner and Engineer
 - 2. After placing systems in service
 - a. Check and adjust any malfunctions and advise plant personnel in operating and adjustment procedures

END OF SECTION