

Section 02529

ELECTROMAGNETIC FLOW METERS

PART 1 GENERAL

1.01 SUMMARY

This Section includes the furnishing and installation of electromagnetic flow meters.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment for Work performed under this Section. Include cost of same in Contract price bid for Work of which this is a component part.
- B. Refer to Section 01270 – “Measurement and Payment” for unit price procedures.

1.03 REFERENCES

This specification references the following publications in their current editions. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

- A. ASQ ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories
- B. ASME B16.5: Pipe Flanges and Flanged Fittings, NPS ½ Through NPS 24 Metric/Inch Standard
- C. ASTM A105/A105M: Standard Specification for Carbon Steel Forgings for Pipe Applications
- D. AWWA Manual M6: Water Meters - Selection, Installation, Testing, and Maintenance
- E. BSI BS 60068-1: Environmental Testing – Part 1: General and Guidance
- F. BSI BS 6920-1: Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water Part 1: Specification A.
- G. BS EN 60068-2-6: Environmental Testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)
- H. National Electric Manufacturers Association (NEMA)
- I. NCSL Z540.3: Requirements for the Calibration of Measuring and Test Equipment
- J. NSF/ANSI 61: Drinking Water System Components - Health Effects

1.04 SUBMITTALS

- A. Submit the following under the provisions of Section 01330 – “Submittal Procedures:”
 - 1. Completed manufacturer’s data sheets, cut sheets, and catalog data
 - 2. Manufacturer’s written and illustrated instructions for the construction and installation method
 - 3. Instruction for handling and storage
 - 4. Dimensions and weight
 - 5. Certified Test Reports for factory tests
- B. Submit the following operation and maintenance data under the provisions of Section 01782 – “Operations and Maintenance Data.”
 - 1. General:

Operation and maintenance data shall cover the flow meter and all appurtenances.
 - 2. Manufacturer bulletins for installing and dismantling the equipment including weights of major components
 - 3. Manufacturer bulletins and manuals for operation and maintenance including schedule of routine checks and maintenance, and troubleshooting guide.
 - 4. Name, address and phone/fax numbers of local suppliers and manufacturer representatives of equipment.
 - 5. Bill of Materials
- C. Coating manufacturer’s technical data sheets, and identification of coating systems used for each piece of equipment or miscellaneous item and application procedures.

1.05 RELATED REQUIREMENTS

- A. Section 01270 – “Measurement and Payment”
- B. Section 01330 – “Submittal Procedures”
- C. Section 01661 – “Water Receiving Facility (WRF) Start-Up”.
- D. Section 01782 – “Operations and Maintenance Data”
- E. Section 02515 – “Hydrostatic Testing of Pipelines”

- F. Section 16473 - "Water Receiving Facilities (WRF) Programmable Logic Controllers (PLC), SCADA Interface Panels and Panel Mounted Equipment"

1.06 QUALITY ASSURANCE

A. Standardization

1. Electromagnetic flow meters and associated appurtenances are to be provided as a package system by one vendor.
2. All components of a given type to be by a single manufacturer

B. System Coordination

Contract Documents describe details of complete equipment installation for purpose specified. Contractor is responsible for all details necessary to properly install, adjust, and place in operation a working system.

C. Requirements of Regulatory Agencies

System to comply with regulations of Texas Commission on Environmental Quality (TCEQ)

1.07 SYSTEM DESCRIPTION (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials and equipment to jobsite with sufficient protection to ensure arrival in undamaged condition.
- B. All mechanical equipment to be stored on sleepers above grade and to be completely protected from damage and exposure to the elements until installation
- C. Handle all components in accordance with manufacturer's instructions to prevent damage.

1.09 - 1.12 (NOT USED)

1.13 WARRANTY

Provide Owner with manufacturer's warranty guaranteeing the flow meters and associated equipment to be free from defects in workmanship and materials, under normal use and service, for two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

- A. Siemens, Model 5100W

- B. Or Approved Equal

2.02 MATERIALS AND/OR EQUIPMENT

- A. Electromagnetic flow meter shall be of the low frequency electromagnetic induction type and produce a DC pulsed signal directly proportional to and linear with the liquid flow rate. The meter tube, signal cable, flow transmitter, and all related equipment and components shall be an integrated system to develop the desired flow signal (4-20 mA).

- B. Flow Tube

1. Housing and Flanges:

Carbon Steel per ASTM A105/A105M with corrosion resistant two-component epoxy coating

2. Liner:

NSF/ANSI 61 Approved Polyurethane, Teflon, or Hard Rubber

3. Electrode material:

316L Stainless Steel or Hastelloy C with electrode conductors and liquid tight conduit

4. Line size: Refer to "ATTACHMENT"

5. Flange: ASME B16.5, Class 150 lbs.

6. Flow Tube: 304 stainless steel

7. Housing configuration:

NEMA 4X or if installed below grade, sealed and filled with an inert material to meet NEMA 6P standards

8. Housing outside coating:

Corrosion resistant two-component epoxy coating

9. Grounding rings: 316L Stainless Steel or Hastelloy C

10. NSF/ANSI 61 certified for use with potable water

11. Standard Calibration: Zero-point, 2 x 25% and 2 x 90%

12. Measuring Range: 0 f/s (0 m/s) to 32.8 f/s (10 m/s)

13. Maximum Operating Pressure: 150 psi

C. Flow Transmitter

1. Provide a flow transmitter with each flow tube. See "ATTACHMENT" for manufacturer and model of transmitter.
2. Field mount transmitter on panel per manufacturer recommendation. See "ATTACHMENT" for mounting position of transmitter.
3. Provide equipment capable of being verified in the field using stand-alone verification devices.
4. Integral or remote mounted transmitters to flow tube capable of being verified in the field using a stand-alone verification device.
5. Transmitter shall include a lithium battery backup to maintain all data including, but limited to, last totalized flow value for a minimum of one year during a power outage.
6. Flow Direction: Bidirectional - reverse flow is indicated by a negative sign
7. At a minimum, provide two (2) eight-digit counters for forward, reverse or net flow.
8. 115 VAC power source (maximum power 300 watts)
9. NEMA 6 Enclosure for non-hazardous area
10. Indicator display with background illumination with alphanumeric text, 3 x 20 characters to indicate rates, totals, and error messages and be protected by a sunshield
11. Provide a keypad with LED light for feedback indication
12. Cable related to the flow tube and transmitter shall be supplied by the meter vendor.
13. Temperature limits: 10°F to 140°F
14. Humidity limits:
1 to 100% relative humidity at 120°F

D. Calibration Standard

1. Each flow meter and transmitter shall be hydraulically calibrated at a facility which is traceable to the National Bureau of Standards. The calibration procedure shall conform to the requirements of ASQ ISO/IEC 17025 and

NCSL Z540.3.

2. A real-time computer generated printout of the actual calibration data indicating apparent and actual flows at 5, 20, and 40 percent of the calibrated range shall be submitted to the Engineer at least 30 days prior to shipment of the meters to the project site.
3. The meter accuracy shall be +/- 0.2% of the flow reading

E. Communications:

1. Flow meter transmitter shall be provided with all necessary hardware and software needed to allow all data to be sent to a Supervisory Control and Data Acquisition (SCADA) system. See Section 16473 - "Water Receiving Facilities (WRF) Programmable Logic Controllers (PLC), SCADA Interface Panels and Panel Mounted Equipment" for more information on the interface between the flow meter transmitter and the SCADA system.
2. The flow meter transmitter shall be equipped with HART (Highway Addressable Remote Transducer Protocol) add-on Communications Protocol modules for transmission of data between the flow meter transmitter and the SCADA system, unless otherwise directed by Plans or the Project Manager. See the "ATTACHMENT" for the type of communication system to be provided.
3. Provide multiple functional outputs for process control, minimum configuration with analogue, pulse/frequency and relay output (e.g. status, flow direction, instantaneous flow).
4. Provide the capability for comprehensive self-diagnostic programs for error indication and error logging.
5. At a minimum, the following parameters shall be monitored by the SCADA System:
 - a. Instantaneous Flow
 - b. Total Flow (totalizer)
 - c. Timed Flow (past 24 hours)
 - d. Additional parameters as identified by the Plans, Project Manager and/or Engineer.
6. The system shall be able to transmit warnings for malfunctions in the flow meter, transmitter, or signal continuity.

F. Accessories/Appurtenances

1. Identification Plate:

A cast brass or stainless steel nameplate with the following information shall be attached to the flow meter:

- a. Manufacturer's Name and Address
- b. Model Number
- c. Serial Number
- d. Nominal Size
- e. Pressure Class

2.03-2.04 (NOT USED)

PART 3 EXECUTION

3.01 GENERAL / MANUFACTURER(S) (NOT USED)

3.02 PREPARATION

The Contractor shall provide the necessary coordination with piping installation to ensure that the electromagnetic flow meters are installed properly.

3.03 ERECTION/INSTALLATION APPLICATION AND/OR CONSTRUCTION

A. Flow meter Installation

1. The Contractor shall install the equipment in accordance with the contract documents, construction schedule, manufacturer drawings and instructions, subject to the approval of the Engineer.
2. The Contractor shall have an experienced and competent representative of the flow meter manufacturer present as needed during installation and during testing to provide technical guidance for the Work and approve the results.
3. Install electromagnetic flow meters and appurtenances in accordance with manufacturer's written instructions to permit intended performance.

3.04 – 3.07 (NOT USED)

3.08 DEMONSTRATION/TESTING AND INSPECTION

A. Hydrostatic Test:

The flow meter shall be subjected to a hydrostatic test with the piping in accordance with Section 02515 – “Hydrostatic Testing of Pipelines.”

B. As requested by the Project Manager, the accuracy of the flow meter shall be verified in the field with a test clamp-on (or companion) flow meter. Both readings should be within the accuracies of the two meters. The test shall be witnessed by the Project Manager, Manufacturer’s Representative and Engineer.

C. Comply with procedures outlined in Section 01661 – “Water Receiving Facility (WRF) Start-Up”.

3.09-3.10 (NOT USED)

ATTACHMENT

[Design Engineer is to complete blanks per site requirements]

A. Flow Meter

1. Manufacturer: Siemens
2. Model: Sitrans FM MAG 5100W Flow Sensor
3. Size: _____
4. Minimum flow rate: _____
5. Maximum flow rate: _____

B. Flow Transmitter

1. Manufacturer: Siemens
2. Model: Sitrans FM MAG 6000i/EX Transmitter with HART communication capability
3. Mounting Position: Top of Flow Sensor or Panel Mounted
4. Communication Modules: HART

END OF SECTION