SECTION 33 59 00 – HYDROCARBON UTILITY METERING

PART 1 - GENERAL

1.01 HYDROCARBON UTILITY METERING DESCRIPTION

A. Components of this system shall conform to ANSI/ASHRAE Standard 135, BACnet® for communication with the Energy Management Dashboard. Where this requirement cannot be met due to incompatibilities with existing or integral components, the contractor shall provide documentation as to how these meters can be integrated into an overall Integrated Energy Management Dashboard through a standard BACnet® protocol.

B. All components newly supplied as BACnet devices shall be tested, certified, clearly stamped, and listed by the BACnet® Testing Laboratories (BTL) prior to the bid date for each project. BTL product listings are available from BACnet® International (http://www.bacnetinternational.net/btl).

1.02 WARRANTY

A. Provide a five (5) year warranty on all equipment installed as part of each project.

B. Maintenance Agreement: The Hydrocarbon Utility Metering Contractor shall provide a written proposal for a five (5) year maintenance agreement.

1. This agreement shall be listed as a separate line item on all project proposals or price quotes and shall include at a minimum the following:

a. Perform inspection and cleaning of system components (e.g., sampling devices, sensors, dampers, valves, etc.)

b. Perform calibration of components.

1.03 RELATED WORK

A. Conformance with all sections of project specifications is required. Additional requirements for the equipment specified within this section are included in, but not limited to, sections in the District's requirements for divisions 01, 23, and 33.

1.04 REFERENCE

A. Requirements of Division 01 govern all work under this section.

B. Piping Requirements of Division 22 govern piping installation practices under this section.

1.05 REFERENCE STANDARDS

A. All project workmanship, materials, and equipment together with the resultant complete and operational Thermal Energy Meter System(s) shall be in compliance with all applicable local, state and federal regulations. At a minimum, the installation shall comply with the applicable sections of the current editions of the following regulations in effect thirty (30) days prior to receipt of bids unless otherwise directed by the authority having jurisdiction:

1. NFPA – National Fuel Gas Code

2. ANSI/ASHRAE Standard 135: BACnet® - A Data Communication Protocol for Building Automation and Control Networks.

3. National Electric Code (NEC) for low voltage wiring.

4. National Electrical Manufacturers Association (NEMA), Enclosure for Electrical Equipment, General Standards for Industrial Controls.

5. All applicable state and local codes.

6. International Mechanical Code (IMC).

7. Underwriters Laboratories (UL).

8. UL-916 – Energy Management Systems (EMS).

1.06 WORK BY OTHERS

A. Installation of:

1. A dedicated 120 VAC circuit from breaker panel to within three (3) feet of any control panel or enclosure required under this contract is the responsibility of the Electrical Contractor. Sharing of circuit including neutral with other loads shall not be permitted.

2. CAT6 Ethernet network drops to any control panel or enclosure required under this contract shall be installed by the Communications Contractor. The communications contractor shall terminate at the control panel to a jack within the panel. The IEMD contractor shall ensure that their panel has a designated location within the panel to accommodate this jack.

B. It is the Hydrocarbon Utility Meter contractor's responsibility to assist in coordinating the locations of all equipment provided and/or installed under this contract. Ultimately, it is the Hydrocarbon Meter contractor's responsibility to ensure instrumentation is located to provide optimal performance and conformance to the manufacturer's installation instructions and this specification's requirements. Where minimum distances or tolerances cannot be met, the contractor must inform the District in writing before final installation.

1.07 QUALITY ASSURANCE

A. Contractor. The Hydrocarbon Utility Metering contractor shall:

1. Have a minimum of five (5) years of experience in the design, installation, and operation of Hydrocarbon Utility Meters of equivalent scope, size and service specified for each project with at minimum of ten (10) complete and operational installations of similar systems.

2. Be an officially authorized representative of the Hydrocarbon Utility Metering Manufacturer with an established relationship of not fewer than three (3) years with at least five (5) installations of comparative size and complexity. Submittals shall document this requirement with references.

3. Assign project managers and project engineers to the project team who are trained and certified by the Hydrocarbon Utility Metering Manufacturer in the design, installation, and operation of the system components and have at least five (5) years of experience with projects and systems of the same complexity and scope as the project.

4. Assign project technicians shall be trained and certified by the Hydrocarbon Utility Metering Manufacturer in the installation and operation of the Hydrocarbon Metering components.

B. Manufacturer.

1. The Hydrocarbon Utility Metering manufacturer shall be engaged full-time in the manufacture of equipment and devices of the scope, size and service required.

2. The Hydrocarbon Utility Metering manufacturer shall operate a Quality Management System certified to comply with ISO 9001:2008.

C. The Hydrocarbon Metering components shall be based upon and installed according to the Hydrocarbon Utility Metering Manufacturer's standard product design and in accordance with the Manufacturer's installation and application requirements.

1.08 SUBMITTALS

A. Equipment and systems requiring approval by the authority having jurisdiction (AHJ) must be approved as complying with all applicable regulations prior to submitting for District review and approval. Obtaining all approvals shall be at the expense of the Hydrocarbon Utility Metering Contractor. Provide a copy of all permits and related correspondence to the District.

B. Provide submittals in compliance with the District's division 01 requirements and as required by this section.

C. No work may begin on any segment of this project until submittals have been successfully reviewed for conformity with the design intent and approved by the District.

D. All submittals and documentation including complete Hydrocarbon Metering engineering design submittal & drawings, project record documents, application engineering documents and Operations & Maintenance (O&M) manuals shall be submitted both in hard copy format organized in 3-ring binders and electronically in the form of an ISO 32000 Portable Document Format (PDF), and as approved by the District.

E. Submit in writing and so delineated at the beginning of each submittal, known conflicts, substitutions, and deviations from requirements of Contract Documents. Deviation from Contract Documents must be approved by the District prior to award of contract.

F. Each submitted document shall clearly reference the applicable specification section and/or drawing that the submittal responds to. General catalogue sheets shall not be acceptable as cut sheets.

G. Submittal documentation and drawings shall consistently use the same abbreviations, symbols, nomenclature and identifiers. Each system element or component shall be assigned a unique identifier consistent with the Contract Documents.

H. Network IP Requirements

1. If required for communications with other building systems, the contractor is to submit a list of all IP network requirements to implement their system communications requirements as designed. This is to include requests for IP addresses and UDP and TCP ports that will need to be opened to allow communications.

2. All IP communications shall be coordinated with the District in advance and are subject to the review and approval of the District's IT representative.

1.09 PROJECT RECORD DOCUMENTS (AS-BUILTS)

A. Upon completion of installation, systems commissioning, and notice of contract completion, submit record documents. Provide an Operations and Maintenance (O&M) manual as indicated in the District's division 01 requirements.

1. Table of Contents. The O&M manual shall include:

a. Names and 24-hour contact information for installing contractors and service representatives.

b. Licenses, guarantees, and warrantee documentation for all equipment and systems.

c. Testing and commissioning reports and checklists.

d. Certificate of Instruction of Owner (District) Personnel.

e. As-built documentation of all project submittal data updated to reflect field conditions and execution.

f. Final Bill of Material with all installed parts, manufacturers, manufacturers' part numbers, and ordering information.

g. A schedule of recommended spare parts with part numbers and supplier, including supplier's current phone number.

h. All original-issue installation and maintenance manuals, user guides, and other documentation provided with all hardware provided as a part of this specification.

1.10 TRAINING

A. Provide and document training as indicated in the District's division 01 requirements.

1.11 WARRANTY

A. The Hydrocarbon Utility Metering manufacturer shall warranty all components installed under this contract to be free of defect in material and workmanship under normal operation and expected service as published by the manufacturer in the unit's performance specifications for a period of five (5) years at a minimum.

B. Hydrocarbon Utility Metering failures during the installation warranty period shall be adjusted, repaired or replaced at no additional cost or reduction in service to the District. Except in the event of property loss or damage, warranty service shall be provided during regular working hours Monday through Friday. The Hydrocarbon Utility Metering Contractor shall respond to failure notifications from the District within twenty-four (24) hours. Repair or replacement of failed components will be scheduled as soon as is feasible.

C. The Hydrocarbon Utility Metering Contractor shall maintain a record of all work done, all items removed from site, all items returned to the site, all new replacement items installed as a result of Warranty service and shall provide both hard copy (printed) and electronic copies of all work records to the District at the time of service.

1.12 MATERIAL DELIVERY AND STORAGE

A. Provide factory shipping cartons for each piece of equipment. The Hydrocarbon Utility Metering Contractor is responsible for the storage of equipment and materials inside and protected from the weather.

B. The Hydrocarbon Utility Metering Contractor is to coordinate with the project General Contractor all on-site laydown and material storage conditions and locations.

C. The Hydrocarbon Utility Metering Contractor shall maintain a current list of all on-site stored material and shall furnish a copy of this list to the project General Contractor and the District on a regular basis, but no less than monthly for the duration of the project.

D. The Hydrocarbon Utility Metering Contractor shall provide documentation of all materials stored off-site and listed as stored material in the project billing documents.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The order of manufacturers does not indicate preference. Inclusion on this list does not guarantee acceptance of products or installation. Hydrocarbon Utility Metering components shall comply with all of the requirements of this specification.

B. The following are approved Hydrocarbon Utility Metering Manufacturers:

1. Thermal Instrument Company Series 600 or 62 Series

2. Siemens Sitrans Series

3. Fox Thermal Products FT Series

4. District approved equal.

C. The selected product line shall be the most current and complete offering from the manufacturer and shall be actively manufactured as part of the manufacturer's standard products and supported by all qualified installers and service personnel at the time that each project is bid.

D. No project shall not be used as a test site. First release and test version equipment shall not be implemented on District projects under any circumstances.

E. Hydrocarbon Utility Metering system components shall be readily available for a minimum of five (5) years after the completion and final acceptance of this project.

2.02 HYDROCARBON FUEL METERS

A. Hydrocarbon Fuel Meter. Hydrocarbon Meters shall be provided as scheduled and shall comply with the following:

1. Meter measurement sensors shall be insertion type if available in pipe sizes at facility with probe lengths appropriate to pipe diameter. If insertion type not appropriate due to pipe size limitations, then inline metering is acceptable with appropriate pipe fittings.

2. Probe insertion shall be through full port ball valve to allow for removal and insertion without system shutdown.

3. All wetted materials shall be 316 stainless steel or metrology as appropriate for gas being measured.

4. The process connection shall be compression, flange, hot tap, or tri-clover as appropriate.

5. The meter shall be installed per the manufacturer's recommendations regarding upstream and downstream pipe diameters.

6. Meter outputs shall reflect both pressure and temperature compensated values.

7. The meter shall include at a minimum the following output options:

    a. Flow rate output as a standard output (4-20 mA or 0-10 VDC signal).

    b. Pulse output for totalized consumption.

8. The meter sensing elements shall comply with the following:

    a. Accuracy +/- 0.50% of full scale with a process fluid temperature span of +/- 50 ^{o}F.

    b. Repeatability of +/- .20% of rate.

    c. Turndown 10:1 minimum.

    d. Response time of 1-2 seconds.

    e. Pressure rating of 0-1200 psig

    f. Mass flow rates of 40 – 50,000 SFPM

    g. Temperature rating of -40 – 350 ^{o}F

9. The meter transmitter shall comply with the following:

    a. 8 digit display for both rate and consumption.

    b. Remote mounting capability

    c. Standard 120/240 VAC or 24 VAC/VDC power.

10. Enclosure shall be rated NEMA 4, Explosion Proof, Class 1, Div 1 Groups B, C, D Weatherproof.

11. Ambient temperature rating of -13 – 140 ^{o}F.

12. ½" – ¾" FNPT connections for power and signal.

PART 3 - EXECUTION

3.01 GENERAL PROJECT REQUIREMENTS

A. The System, all its components, execution, and compliance with this specification is the responsibility of the Hydrocarbon Utility Metering Contractor.

1. Unless specified otherwise, all devices and components as required to meet the intent of the project requirements shall be provided as a part of this section.

B. Statement of Compliance. The Hydrocarbon Utility Metering Contractor must submit a Statement of Compliance to the District which indicates compliance with the specification requirements in a spreadsheet format.

1. Statement of Compliance. The Water Utility Metering Equipment Contractor must submit a Statement of Compliance to the District which indicates compliance with the specification requirements in a spreadsheet format

2. The Statement of Compliance must be received by the District a minimum of fourteen (14) days prior to the bid/tender date; and must be received prior to submitting any proposals or pricing.

3. For each component, the individual model/type and version to be provided under this specification must be represented in the Statement of Compliance complete with Specification clause, Tag, Manufacturer, Make, Model, Version, and Quantity.

4. For any component that complies with all specification requirements, a single line may be entered in the Statement of Compliance indicating simply, “Complies with all requirements as specified.” If all components comply with all specification requirements, a signed statement on company letterhead may be submitted indicating that “All components comply with all requirements as specified.”

5. For any component that does not comply with all specification requirements, each specification clause applicable to the component must be listed in the Statement of Compliance and for each clause the contractor must indicate either “Comply” or “Does Not Comply.”

6. If, after having submitted a Statement of Compliance indicating that a component is in-compliance with the requirements of the specification, the component is found to be non-compliant, it shall be the responsibility of the Contractor to replace the component at no additional charge with a compliant component. Approval of a replacement component is subject to approval by the District.

7. If a component is omitted from the Statement of Compliance and is found to be non-compliant, it shall be the responsibility of the Contractor to replace the component at no additional charge with a compliant component. Approval of a replacement component is subject to approval by the District.

8. If a Statement of Compliance is not submitted, it shall be the responsibility of the Contractor to replace any non-compliant component at no additional charge with a compliant component. Approval of a replacement component is subject to approval by the District.

3.02 COORDINATION

A. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades and equipment manufacturers to ensure a fully functioning and complete system.

B. The demarcation of work and responsibilities between the Hydrocarbon Utility Metering Contractor and other related trades shall be as outlined in the Responsibility Matrix herein. This matrix is not intended to relieve the Hydrocarbon Utility Metering Contractor of the obligation to assure the complete execution of any work for which responsibility is assigned to the Hydrocarbon Utility Metering Contractor when the Hydrocarbon Utility Metering Contractor is a sub-contractor to the Mechanical Contractor.

C. The District's approved project team manager shall be the final arbiter regarding the responsibility matrix.

D. The responsibility matrix key is as follows:

1. IEMD Integrated Energy Management Dashboard Contractor

2. BAS Building Automation System Contractor

3. P Plumbing Contractor

4. H HVAC Contractor

5. E Electrical Contractor

6. C Division 27 Communications Contractor

7. P Plumbing Contractor

8. EP Power for the device controls is provided by means internal to the device. Control power is provided from the power circuit to the device, which is the responsibility of the Electrical Contractor.

9. Wiring Note: Power wiring by "IEMD" indicates that the IEMD Contractor is responsible for extending power from a junction box or source, which has been provided by the Electrical Contractor, to a device or through a transformer to low voltage system. Transformer is to be provided by the IEMD Contractor.

10. Except where there is potential for encountering high voltages or volatile gases that may require specialized PPE and/or installation safeguards it is the responsibility of the contractor furnishing the equipment or device to terminate all integral wiring supplied with the equipment or device.

RESPONSIBILITY MATRIX

WORK		**Furnished By:**	**Installed By:**	**Low Voltage Wiring By:**	**Power Wiring By:**
8	Hydrocarbon Fuel Meter Installation	P/IEMD	P	IEMD	IEMD
9	Hydrocarbon Fuel Meter interconnecting serial communications	IEMD	IEMD	N/A	N/A
10	Hydrocarbon Fuel Meter interconnecting Ethernet communications	IEMD	IEMD	N/A	N/A
11	Hydrocarbon Fuel Meter IP communications drops	C	C	N/A	N/A
12	Hydrocarbon Fuel Meter data analytics	IEMD	IEMD	N/A	N/A

E. Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Integrated Energy Management Dashboard (IEMD) contractor or the assigned supplying contractor shall assist in coordinating space requirements.

F. Coordinate and schedule work with all other trades in the same area or with work that is dependent upon other trades to facilitate mutual progress. Report all conflicts and anticipated delays to the project construction management team for resolution immediately upon identification.

G. Other sections and/or divisions of this specification include controls and control devices that are to be a part of or interfaced to the Integrated Energy Management Dashboard (IEMD) specified in this section. These devices shall be integrated into the Building Automation System (BAS) and coordinated by the Building Automation System (BAS) Contractor as follows:

1. The Contractor/Supplier furnishing and/or providing any products or devices to be integrated to the Integrated Energy Management Dashboard (IEMD) are responsible for the configuration, programming, start-up, testing, and proof-of-performance of that product to meet the requirements of their associated specifications.

2. The Integrated Energy Management Dashboard (IEMD) Contractor shall coordinate resolution of incompatibilities that arise between the control products provided as a part of this section and products provided as a part of other sections or divisions of the specification.

3.03 GENERAL WORKMANSHIP

A. The Hydrocarbon Utility Metering installation shall be performed by professionals in a workmanlike manner consistent with acceptable industry standards for performance and in compliance with the contract documents, Project Plumbing Specifications, and any/all applicable local codes and/or Authorities Having Jurisdiction (AHJ) and in compliance with the following at a minimum:

1. Installation of all devices and equipment shall be in accordance with the manufacturers' recommended installation procedures and as indicated in the contract documents.

2. Install all equipment as to be readily accessible as defined by local codes and standards whichever is more stringent and such that it provides sufficient clearance for system maintenance, component service, calibration, removal, repair or replacement.

3. Install all equipment and piping parallel to building lines.

4. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment as required by regulations.

5. All devices mounted outdoors shall be protected by a weather-shield, integral outdoor enclosure, etc. and from ambient elements in such a manner as to not impede design functionality and/or sensing.

6. Penetrations through and mounting holes in the building exterior associated with the Hydrocarbon Utility Metering installation shall be sealed and made watertight.

3.04 FIELD QUALITY CONTROL

A. The Hydrocarbon Utility Metering Contractor shall continually monitor the field installation for code compliance and quality of workmanship.

B. The Hydrocarbon Utility Metering Contractor shall have all work inspected as required by the AHJ.

3.05 QUALITY ASSURANCE

A. Upon request, the Hydrocarbon Utility Metering Contractor shall provide documentation supporting certified compliance with ISO 9001:2008 containing the ISO 9001:2008 Certification Mark from an applicable registrar.

B. The Hydrocarbon Utility Metering Contractor shall be responsible for inspection and Quality Assurance (QA) for all materials and workmanship provided under this specification section.

C. The Hydrocarbon Utility Metering Contractor shall maintain a comprehensive service office within 160 miles (260 km) of the project location by the bid date and at a minimum until the completion of the warranty period.

1. This comprehensive service office shall be defined as a full-time, operational center where Hydrocarbon Utility Metering installation professionals are regularly employed performing at a minimum the responsibilities and services of installation, design, application engineering, service, and project management.

3.06 INSTRUCTIONS TO OTHER CONTRACTORS

A. Instrument/metering Installation. It is the responsibility of the Hydrocarbon Utility Metering contractor to coordinate the locations and installation methods to the appropriate trades for installation of any metering or other devices supplied by the Hydrocarbon Utility Metering Contractor but installed by others.