



AUTOMATIC TANK GAUGE (UST & AST) BID SPECIFICATION FOR A SITE
WITH 1 - 4 STORAGE TANKS

PART 1 – GENERAL

The specifications that follow outline the base requirements for the hardware, software & installation of a monitoring system for underground or aboveground liquid storage tanks (UST & AST) and relevant associated systems.

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, tools and equipment and install all instrumentation and controls associated with all new or upgraded Petroleum systems as required by the Contract Drawings.

The UST monitoring system to be installed shall perform in accordance with Subpart D of 40 CFR 280 and, as a standard of high performance and quality, shall meet the performance specifications and functionality of the Veeder-Root TLS ATG tank monitoring system.

1.02 APPLICABLE STANDARDS

All instrumentation and control equipment shall comply with the following standards and all other applicable federal, state and Building Official and Code Administrators (BOCA) Building Codes including revisions to the date of Contract.

- NFPA National Fire Protection Association
- EPA Environmental Protection Agency
- UL Underwriter Laboratories Inc.
- ULC Underwriter Laboratories of Canada
- ANSI American National Standards Institute
- ASTM American Society of Testing Materials
- ASME American Society of Mechanical Engineers
- NEC National Electric Code
- ISA Instrumentation Society of America
- NEMA National Electrical Manufacturers Association
- IEEE Institute of Electrical and Electronic Engineers

The Board of Standards and Appeals of the City of New York
The Building Code of the City of New York
New York City Fire Lay Handbook
API American Petroleum Institute
Underground Storage Tanks: Subpart D, 40 CFR Part 280

1.03 SUBMITTALS

- a. Shop Drawings:
1. Wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will function properly as a unit. Site specific, sealed electrical drawings will be furnished by the Contractor or Engineering Consultant.
 2. Equipment and instrument list, including size, input/output types, expected range of operation, utility requirements, and materials of construction. A Bill of Materials also shall be included and keyed to the drawings. The Bill of Materials shall provide sufficient information to determine compliance with the Contract Drawings and Specifications.
 3. Drawings showing the proposed layout and anchorage of equipment and appurtenances and equipment relationship to other parts of work, including clearances for maintenance and operation.
 4. Manufacturers' descriptive and technical literature, including catalog cuts and or technical document CDs.
 5. Legends for name plates.
 6. Equipment certifications and relevant third party test reports (if required).
- B. Spare Parts Data: within 30 days of Shop Drawing approval, the Contractor shall furnish spare parts data for each different item of material and equipment specified. Data shall include a complete list of parts and supplies, with current unit prices and a source of supply. A list of all special tools required for installation, maintenance or repair of equipment shall be provided.

The Contractor shall furnish those spare parts and special tools which are recommended by the manufacturers. The Contractor also shall provide a 12-month supply of any expendable items and frequently replaced parts as identified by the manufacturer. These items shall include but not be limited to: 24 rolls of paper.

- C. Operating and maintenance instructions shall be provided for each different type of control, instrument and system.
 - 1. The Contractor shall furnish to the Construction Manager six (6) complete copies of the operating instructions outlining the procedures required for equipment and system start-up, operation and shut-down. The instructions shall include the manufacturer's name, model number, service manual, parts list, and a brief description of all equipment and their basic operating features.
 - 2. The Contractor shall furnish to the Construction Manager six (6) complete copies of maintenance instructions listing routine maintenance procedures, possible breakdown and repairs and troubleshooting guide.
- D. Performance Test Reports: Upon completion and testing of the installed system, test reports shall be submitted in booklet form showing that all field tests are performed to adjust each component and that all field tests are performed to prove compliance with the specified performance criteria. Each test report shall indicate the final position of the controls.

1.03 QUALITY ASSURANCE

- A. Installation of all gasoline systems shall be performed by a Contractor who is a licensed installer in the State of XXXXXX for underground tank systems. The Contractor shall be certified by the tank manufacturer as a trained fiberglass or steel tank installer.
- B. The Contractor shall purchase the gasoline systems from a manufacturer approved by the Construction Manager. The manufacturer shall maintain a service depot within the State of XXXXXX with parts and service personnel available for servicing parts at any time. The Manufacturer shall furnish required supervision for the installation of the systems and shall furnish an experienced installation and maintenance worker for the

supervision of personnel in the initial operation and maintenance of the systems.

- C. The Contractor shall install compatible components and shall perform all modifications necessary for the proper operation and guarantee of the equipment. The Construction Manager reserves the right to require the Contractor to make such tests during the installation and upon the completion thereof, as may be necessary to demonstrate that the work and equipment, as installed, complies with the Contract Specifications and requirements provided herein. The Contractor shall provide all labor, instruments and apparatus required for such tests. If any of the work or equipment fails to meet the Contract Requirements or to function properly, the defects shall be rectified at the Contractor's own expense by readjusting or by removing and replacing the faulty work or equipment until under test, the requirements are met. The Construction Manager reserves the right to check the Contractor's instrument or to furnish his own instruments.

1.04 MANUFACTURER'S SERVICES

- A. The Contractor may provide the services of a manufacturer's representative, who is experienced in the installation, adjustment and operation of the instruments and controls specified. The representative may supervise the installation, adjustment and testing of the equipment.
- B. The leak detection/inventory control system shall include a minimum five-year warranty and fuel management services contract for the entire system that includes on-site replacement of parts, programming, testing of system features and a minimum of the following:
 - 1. Consolidated monthly reports on all tanks, lines and sensors.
 - 2. Remote monitoring for all sites installed or upgraded.
 - 3. A tank test performance guarantee for all UST sites.
 - 4. Alarm response 24 hours a day 7 days a week.

- a. Notifies detailed personnel according to alarm condition and type.
- b. Archives alarm reports continuously.
- c. Allow instant access to consolidated alarm history.
- d. Allows protocol for each individual alarm.

PART 2 – PRODUCTS

2.01 GENERAL

The general instrumentation requirements are identified on the Contract Drawings. All instruments and control equipment shall conform to the following general provisions.

- A. All equipment in a system shall be compatible in function and appearance. Provisions shall be made, where necessary, for signal dampening to suppress noise and spurious electrical signals in order to provide the desired degree of performance.
- B. All instrument supports and interconnecting wiring and conduit shall be as recommended by the manufacturer and approved by the Construction Manager.
- C. Identifying tag number for each instrument shall be permanently etched or embossed onto a durable tag which shall be fastened to the device housing with stainless steel rivets or self-tapping, stainless-steel screws of appropriate size. Where neither of the above fastening can be accomplished, tag number nameplates shall be permanently attached to the device by a circllet of stainless-steel wire.
- D. All instruments and devices furnished under this Section requiring electrical power shall be suitable for operation on a 120Volt $\pm 10\%$, 60 Hertz ± 2 Hertz supply.
- E. All instruments shall return to accurate measurement upon restoration of power after a power failure.
- F. Unless otherwise noted, all instruments in contact with a process stream shall be furnished with diaphragm seals.
- G. Instruments shall be guaranteed to maintain the characteristics listed herein and under conditions listed and shall meet the following specifications, except where otherwise noted:

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| 1. | Accuracy: | $\pm 1\%$ of span |
| 2. | Repeatability: | $\pm 0.1\%$ of span |
| 3. | Dead Band: | $\pm 1\%$ of span (where applicable in accordance with ISA Standard S50.1 |

4. All signal generators and transmitters shall be capable of operating at a load of 600 ohm in accordance with ISA Standard S50.1, higher when specified. Signals shall be output isolated.
 5. All electronic instruments shall be solid-state and shall be capable of operating throughout the temperature range of 32 degrees Fahrenheit to 110 degrees Fahrenheit (0-50 Degrees Celsius), unless otherwise specified.
 6. Temperature effect on calibration shall be equal to or less than 1% over a temperature change of 100 degrees Fahrenheit.
- H. The ranges and scales shall be as per specified, shown on the Contract Drawings, or approved by the Construction Manager.
 - I. Where separate measuring elements and transmitters are required, they shall be fully matched and any special cables or equipments required must be supplied for installation.
 - J. The Contractor shall be responsible for matching of electrical characteristics of instruments and shall supply transmitters with ample signal output capacity. Additional signal generators or repeaters shall be avoided if possible, but must be supplied if necessary.
 - K. All equipment, unless otherwise specified, shall be furnished in the manufacturer's standard enclosure for the service indicated by the equipment location.
 - L. All miscellaneous necessary work required to complete installation shall be included. This work includes, but is not limited to bolts, nuts, studs, gaskets, pipe tapping, holes through walls and repair.
 - M. Electrical control conductors shall be No. 14 AWG or larger. Conductors larger than No. 14 shall be used where herein specified or where indicated on the Contract Drawings.
 - N. The size of the conductors and other current-carrying parts of switches and control equipment shall be ample for the rating of the devices to which they are to be connected for service, without undue heating. In no case shall the current density exceed 1,000 amperes per square inch of cross-section. At contacts, the current density shall not exceed 150 amperes per square inch.

2.02 LEAK DETECTION/INVENTORY CONTROL SYSTEM

- A. The leak detection/inventory control system shall include all parts, equipment and software necessary for a complete system. All software, firmware, and hardware shall be of the latest revisions at the time of contract signing and/or requisition placement. The leak detection/inventory control system shall include but not be limited to the following:
5. One (1) monitoring system console capable of controlling up to 4 tank probes and associated sensors.
 6. One (1) magnetostrictive technology type, inventory control and or in-tank leak testing probe assembly (per tank, as required).
 7. One (1) annular space liquid leak sensor for interstitial space (per double-wall tank as required).
 8. One (1) liquid leak sensor for manway sump (per sump, as required), for underground storage tanks only.
 9. One (1) overflow alarm with acknowledgment switch
- B. The controller-console shall be capable of performing in-tank leak detection functions, automatic tank calibration and charting, and external leak detection functions. The controller shall be completely compatible with all probes, sensors and dispensers. The controller shall have a liquid crystal display (LCD) identifying inventory, system status, setup and diagnostics. The controller shall be supplied with an integral printer. The controller shall be supplied with an internal telephone fax/modem/dialer. The fax/modem shall be capable of dialing a pre-programmed telephone number at operator specified alarm or inventory conditions. The controller shall include all software and interface modules required for probes, sensors, dispensers, alarms, modems and other input/output devices required for a complete system. The controller shall be a model TLS series, as manufactured by Veeder-Root of Simsbury, Connecticut, or approved equal.
- C. The inventory control and in-tank testing probe assembly shall be of the magnetostrictive technology type. The in-tank probe shall be capable of measuring product level in the tank in inches, and detecting the presence of water in the tank. The probe shall be capable of performing the 0.1 gallons per hour volumetric tank tightness testing and 0.2 gallons per hour automatic tank gauge testing in the tank system. The probe shall meet NEC, NFPA, and UL requirements for hazardous locations. Probe electronics shall

be capable of operating from -20 Celsius to +50 Celsius. The in-tank probe assembly shall include 4-inch floats and 4-inch sealed riser cap and ring. Each probe shall be completely compatible with the fluid to be stored in the tank. To insure maximum protection against electrical interference and to provide a more reliable data stream the probe interface must be of digital technology. The probe assembly shall also include Magnetostrictive Probe Installation Kit, and Riser Cap and Ring Kit, as manufactured by Veeder-Root of Simsbury Connecticut or approved equal.

- D. The annular space liquid sensing probe shall be capable of detecting and differentiating between liquid hydrocarbons and other liquids in the interstitial space between tank walls. The probe shall meet NEC, NFPA and UL requirements for hazardous locations. Probe electronics shall be capable of operating from -20 degrees Celsius to +70 degrees Celsius. Annular space sensor shall be Series 7943 Discriminating Interstitial Sensor for Fiberglass Tanks as manufactured by Veeder-Root of Simsbury Connecticut or approved equal.
- E. The manway sump sensing probe (underground storage tanks only) shall be capable of detecting and differentiating between liquid hydrocarbons and other liquids in the manway containment sump. The probe shall meet NEC, NFPA and UL requirements for hazardous locations and shall be capable of withstanding the harsh environment and wide temperature ranges possible in the intended location. Containment sump sensor shall be Series 7943 Containment Sump Sensor, Model No. 794380-208 as manufactured by Veeder-Root of Simsbury Connecticut or approved equal.
- F. The overfill alarm shall be the audible horn and flashing light type. The overfill alarm shall be supplied with an alarm acknowledgment switch. Alarm electronics shall be capable of operating from -40 degrees Fahrenheit to +150 degrees Fahrenheit. The alarm and acknowledgment switch shall be Series 7900 Overfill Alarm and Alarm Acknowledgment Switch, Models No. 790091-001 and 790095-001, as manufactured by Veeder-Root of Simsbury Connecticut or approved equal.
- G. Direct burial cable shall be used where allowed by code and furnished by the system manufacturer. They shall include but not be limited to:

#848100-500 Direct Burial Cable #848100-310 3 Conductor Cable
#848100-110 Filler Rod, 1000 ft #848100-501 Splice Kit

PART 3 EXECUTION

3.01 GENERAL

- A. The contractor performing the installation and subsequent follow-on service must be an authorized service contractor with the Gilbarco Veeder-Root Company.
- B. Installation of all equipment shall be in accordance with BOCA building codes and the NFPA, NEC and NEMA Codes. The Contractor shall furnish and install all required conduit sealing fittings, explosion-proof accessories and NEMA Type 7 enclosures where indicated on the Contract Drawings or where required by Code or both.
- C. The locations shown for instrumentation and control equipment on the Contract Drawings are approximate. The Contractor shall field locate as directed by the Construction Manager. The Contractor shall field locate the new TLS-300 series controller at a location which is accessible or remote accessible from an occupied work station. All power and control wiring and connections not specifically indicated on the Contract Drawings but required for the proper operation of equipment shall be made by the Contractor in accordance with these Specifications. All electrical control and instrumentation equipment installed in Class 1 hazardous locations shall be installed in NEMA Type 7 enclosures. Conduits and wireways leading to and from these areas shall be provided with sealing fittings. All non-conducting metal parts of switches and controls shall be rust-proofed by galvanizing, cadmium plating, baked enamels or by the use of a bib-corroding metal. Springs, wherever used, shall be a phosphor bronze.
- D. Each leak detection inventory control system shall be installed, programmed and adjusted in accordance with the manufacturer's instructions so that all components function properly. Each overfill alarm and alarm acknowledgement switch shall be programmed and adjusted so that the alarm is activated at 85 percent of the tanks capacity. Each waste oil overfill alarm and alarm acknowledgement switch shall be programmed and adjusted so that the alarm is activated at 80 percent of the tank capacity.

3.02 TESTING

- A. General: All equipment (hardware and software) shall be factory and field tested to demonstrate that it provides the specified functions.
- B. The factory and onsite test procedures shall be submitted to the Construction Manager for approval prior to starting the actual tests.
- C. The onsite testing shall include checking of cables, testing of system subassemblies and checking of connections for each component and for the entire instrumentation and control system.
- D. The Contractor shall notify the Construction Manager in writing that he is ready and desires to start the on-site system testing. The Construction Manager will authorize start of the testing at a mutually-agreed starting date.
- E. Shop Testing: All activating devices, instruments and assemblies furnished under this item shall be set up in the shop of the manufacturer and tested over the full range of the equipment. The equipment shall satisfactorily perform all the functions within the requirements of the specifications.
- F. Field Testing: All instruments and systems shall be field tested to ensure conformance with the Specifications. Control systems shall receive dynamic loop tests which shall conform to the intent of ANSI: MC4.1 (ISA-S26). The control systems and equipment shall include provisions for such testing.
- G. Input signals for equipment control shall be simulated for at least 5 signal values from 0 to 100 percent signal, with corresponding equipment response to be manually recorded and adjustments made as required. Output signals from the equipment shall be read for at least 5 signal values from 0 to 100 percent of the meaningful process values and adjustments shall be made as required.
- H. All instruments used for control functions shall be tested with the final elements in the circuit in addition to simulated control methods. The Contractor shall adjust instruments and/or final elements to obtain the best working conditions for a dynamic system.

END OF SPECIFICATION