

# SUGGESTED SPECIFICATIONS

**Note To Consultants and Designers:** Use this document as a guide when writing specifications for Storage Tank Liquid Level Management Systems requiring 0.1 GPH or 0.2 GPH In-Tank leak detection, and/or secondary containment leak detection capabilities, which meet or exceed the current Standard EPA required protocols.

Client \_\_\_\_\_

Project Name \_\_\_\_\_

Project Number \_\_\_\_\_

## **EPA Compliant TMS2000 Precision In-Tank Liquid Level Control and External Leak Sensor Management System for both Underground and Aboveground Tanks**

**I. General:** These specifications are provided to prospective bidders and engineering consultants as a guide to understanding the requirements relative to furnishing and installing an electronic monitoring system for underground liquid storage tanks (USTs), associated buried piping and containment areas. This document will address and describe the capabilities and performance standards of the model **TMS2000** Tank Management and Leak Detection system as set forth and in accordance with the USEPA Federal standards for (USTs) as described in Subpart D, 40 CFR Part 280.

**II. Relevant Documents:** The tank monitoring system shall meet all of the applicable performance specifications and regulatory agency requirements set forth by the following organizations:

- American Petroleum Institute (API)
- American Society for Testing and Materials (ASTM)
- Environmental Protection Agency (EPA)
- Federal Communications Commission (FCC)
- National Electric Code (NEC)
- National Fire Protection Agency (NFPA)
- Underground Storage Tank: Subpart D, 40 CFR Part 280
- Underwriters Laboratories (UL)

**III. Controller:** The controller shall be microprocessor-based, and shall be designed and constructed with modular architecture easily permitting either factory or field upgrades and servicing. Configuration and set-up data shall be maintained in non-volatile memory having a minimum fifty (50) year data retention without requiring power of any kind. Replacement or substitution of any controller plug-in card shall not require system re-configuration. Real-Time clock and non-critical log data, such as inventory, delivery, alarm, theft, error, and leak reports shall be maintained in battery backed non-volatile memory with a minimum data retention of from (5)-(10) years in the event of a power outage. System shall include digital display for viewing tank information and LED indicators for the alarm conditions.

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System shall have the capability to continuously monitor up to two (2) dual-float magnetostrictive in-tank level probes and up to eight (8) secondary containment leak or point-level sensors. Leak and point-level sensor inputs shall support a means to detect sensor open-circuit and short-circuit wiring faults as a standard feature when used in conjunction with fault-reporting sensors. The system shall provide hardcopy 24 column environmental compliance reports, which exit the front panel or are stored internally with optional autowinder take-up spool. The RS-232 serial port shall be standard for communications with a local PC computer. Optional internal modem shall be available for secure telephone link access to the remotely located PC. Optional Ethernet network interface card shall be available for LAN/WAN connections. Optional ModBus RS-485 RTU interface card shall be available for BMS/PLC communications. Optional 6 or 12-channel Analog Output card shall be available to provide 0-20ma/4-20ma/0-24ma/0-1ma signals for tank-related real-time data. System shall operate on switch selectable 115/230 VAC (+/- 10%), 50/60 Hz. Maximum power consumption shall be 20 watts.

**1. Console:** The console shall be housed in a lockable wall mounted NEMA 12 enclosure and optionally available in NEMA 4 or 4X outdoor configurations. A printer option with autowinder shall be available for the outdoor versions. The console shall include microprocessor board, probe/sensor card, power supply, control I/O and communications interfaces. Front panel display shall include audible and visual alarms, user-friendly membrane pushbutton controls, and optional impact printer. The display shall be nine digit, seven segment, quasi-alphanumeric sunlight-readable LED type, with LED alarm annunciators for five (5) alarm conditions; leak, three (3) tank product setpoints, and one (1) bottom water setpoint per tank. LED alarm lights shall be visible from at least 60 feet and the seven-segment display data shall be readable from no less than twenty (20) feet. Displays shall include product gross or net, percent of capacity, 90/95/100% ullage, product and water level, product temperature, and product type. As a standard, two (2) programmable relay outputs and two (2) contact closure inputs shall be provided. Optionally, a modular card containing an additional four (4) relays and four (4) contact closure inputs, eight (8) relays and eight (8) contact closure inputs, or sixteen (16) relays shall be made available. All relays and contact closure inputs shall be user-programmable for activation by the following event types; Theft, Power Fail Recovery, System Error, Tank Leak, Product Setpoints, Water Setpoints, Leak/Point Level Sensors, Contact Closure inputs and Line Leak. The system shall be supplied with three industrial quality front panel sealed membrane pushbuttons labeled MODE, TANK SELECT, and TEST. Membrane pushbuttons shall be utilized in conjunction with the display screen to select tank quantities, view, set, acknowledge alarm conditions; set/review configuration data, initiate system tests, view inventory and other logged data. The system shall provide hardcopy environmental compliance and status reports via front panel 24-column printer or with optional autowinder take-up spool. The RS-232 serial port shall be provided as standard for two-way communications with a PC computer. Microsoft Windows 95 thru XP compatible software shall be provided to retrieve and display current tank statuses, remotely read, write and initialize system setup, clock, and configuration data. An RS-485 port shall be provided as standard for connection to "smart" peripherals, such as remote "slave" display and annunciator panels. The system shall be independently third party certified for UST petroleum storage tanks and have the capability to automatically or manually conduct a static volumetric tank tightness test to an accuracy of 0.2 GPH for monthly monitoring and 0.1 GPH for annual precision testing, with minimum test times of two hours and eight hours respectively. System shall be capable of performing both tests with as little as 20% of tank capacity.

Console shall be Pneumercator **Model Series TMS2000**.

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**2. Tank Gauging Probe:** Probe shall be designed for both AST and UST applications and shall have performance characteristics permitting 0.1 GPH or better in-tank leak test with continuous gauging accuracy of +/- 0.0005 inches for product, +/- 0.001 for water and +/- 0.001 degrees F for (relative) temperature. Probe shall contain an array of at least five (5) temperature sensors along its length for accurate volumetric temperature compensation. Probe to console communication shall employ digital transmission techniques carried over standard, readily available two-conductor, shielded cable, with a maximum cable length restriction of no less than 4000 feet. Probe operating temperature and pressure shall be -40 to +175 degrees F and 150 PSIG respectively. Probes shall be supplied with product float, water float, six (6) foot leader cable with watertight connector, and centering rings for riser mounted applications. Probe shall be UL/CSA approved for use in Class I, Division I, Group C & D hazardous locations.

Probe shall be Pneumercator **Model MP450S** for rigid lengths from 24 to 216 inches.

Probe shall be Pneumercator **Model MP451S** for rigid lengths from 217 to 288 inches.

Probe shall be Pneumercator **Model MP452S** for oil/water separator tanks.

Probe shall be Pneumercator **Model MP461S** for flexible lengths from 12 to 216 inches.

Probe shall be Pneumercator **Model MP462S** for flexible lengths from 217 to 288 inches.

Probe shall be Pneumercator **Model MP463S** for flexible lengths from 289 to 600 inches.

**3. Secondary Containment Leak Sensors:** Both non-discriminating and product/water-discriminating leak sensors shall be available for liquid detection in interstitial spaces, containment areas, sumps, brine reservoirs, dispenser pans and piping locations. All sensors shall be optionally available with a wiring fault detection feature.

## **Non-Discriminating Type Liquid Sensors**

**3A.** Alternate sump, dispenser pan and steel tank double-wall sensor shall be a 2-wire type consisting of a magnetic, Buna-N float encased within a 1-1/2 inch diameter, stainless steel outer housing and supplied with twenty-five (25) feet of 2-conductor #22 AWG gage wire. Sensor shall be rated to 50 PSIG at 160F with an accuracy of 1/2-inch of liquid. Optional configuration utilizing 1-3/4 inch diameter stainless steel/Teflon housing, stainless steel float and Teflon-jacketed cable shall be available for solvent/fuel additive applications. Sensors shall be available with wiring fault detection option [F].

Petroleum sump, dispenser pan and steel tank double-wall leak sensor shall be Pneumercator **Model LS600-LD-BN-[F]**.

Solvent sump, dispenser pan and steel tank double-wall leak sensor shall be Pneumercator **Model LS600-LD-SS-[F]**.

**3B.** Alternate dispenser pan or fiberglass tank annular sensor shall be a 2-wire type consisting of a horizontally-oriented magnetic float encased within a fabricated PVC outer housing and supplied with twenty-five (25) feet of 2 conductor #22 AWG gage wire. Sensor shall pass through a fiberglass double-wall tank annular space tank opening. Sensor shall provide an accuracy of 1/2 inch of liquid. Sensor shall be available with wiring fault detection option [F].

Dispenser pan or fiberglass tank annular leak sensor shall be Pneumercator **Model LS610-[F]**.

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**3C.** Wet annular reservoir sensor shall be 3-wire type consisting of dual magnetic floats capable of detecting breached inner or outer walls of a double-wall fiberglass tank. The reservoir sensor and its components shall be provided with a non-corroding PVC outer housing, float and guide stem assembly, and sixteen (16) feet of 3-conductor #22 AWG gage wire. Sensor shall mount in a specified manway on top of each tank and rest on the reservoir floor. The Hydrostatic sensor shall detect changes in the reservoir brine or glycol solution when the level drops below 2 inches or rises above 11 inches of liquid. An alternate 2-wire type shall be available with built-in wiring fault detection.

3-wire wet annular reservoir leak sensor shall be Pneumercator **Model RSU800-2**.

2-wire wet annular reservoir leak sensor shall be Pneumercator **Model RSU801-[F]**.

**3D.** An electronic sump, dispenser pan and dry annular sensor utilizing optical technology and no moving parts shall be available to sense the presence of liquid within a secondary containment space. Sensor shall operate reliably with cable lengths up to 4000 feet and shall include both wiring and sensor fault detection as a standard feature. Sensor assembly shall be provided with a twenty-five (25) foot, 3-conductor, #22 AWG gage wire cable. Sensor shall be optionally available with an extended low operating temperature of -40 degrees F. Sensor shall be optionally available in materials of construction suitable for use in solvent or chemical applications.

Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100F**. (Standard)

Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100XF**. (Extended Temperature)

Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100CF**. (Chemical/Solvent Resistant)

## **Discriminating Type Liquid Sensors**

**3E.** A discriminating electronic sump, dispenser pan and dry annular sensor utilizing both electro-optical and conductivity technologies shall be available for detecting and differentiating between the presence liquid hydrocarbon and water within a secondary containment space. Sensor shall operate reliably with cable lengths up to 4000 feet and shall include both wiring and sensor fault detection as a standard feature. Sensor assemblies shall be provided with a twenty-five (25) foot, 3-conductor, #22 AWG gage wire cable. Sensor shall be optionally available with an extended low operating temperature of -40 degrees F.

Discriminating sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-200F**. (Standard)

Discriminating sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-200XF**. (Extended Temperature)

**3F.** A discriminating, flexible electronic wet well sensor utilizing conductive polymer technology shall be available for detecting the presence of hydrocarbon-based liquids floating on water anywhere along its sensing length. The sensor shall be unaffected by the presence of water or hydrocarbon vapor. Sensor shall operate reliably with cable lengths up to 4000 feet. Sensor assembly shall be provided with a four-foot, 2-conductor leader cable with mating sensor connector. Sensor shall alarm for either "hydrocarbon present" or "dry well" conditions. An

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optional version shall be available in a 3-wire configuration to provide separate alarms for “hydrocarbon present” and “dry well” conditions.

Wet well leak sensor shall be Pneumercator **Model HS100**. (Standard)

Wet well leak sensor shall be Pneumercator **Model HS100D** (Separate hydrocarbon and dry well alarms)

## **IV. External Remote Audible/Visual Displays and Annunciators:**

**4A.** Remote Audible/Visual Alarm Annunciator shall consist of a solid state electronic wall-mounted Strobe/Siren combination housed in a NEMA 4X weatherproof enclosure. The audible annunciator shall have a minimum rating of 101db at ten (10) feet. The visual annunciator shall be Xenon strobe type with a minimum rating of fifteen (15) candelas. Multiple annunciators shall have the capability of being connected in a daisy chain or parallel configuration. A separate Test/Reset remote switch assembly shall also be available in a NEMA 4X enclosure to be used in conjunction with the remote audible/visual alarm, permitting the annunciator to be mounted with an optimal mounting height for maximum visual and audible range, yet providing access to Test/Reset functions. Acknowledging alarms shall only silence the audible alarm, while the visual alarm remains until the condition is corrected. The Test button shall be provided to verify operation of both the audible and visual alarms. System shall operate on switch selectable 110/220VAC(+/- 10%), 50/60 Hz line voltage. Maximum power consumption shall be less than 5 watts.

External Remote Annunciator shall be Pneumercator **Model RA200**.

External Remote Test/Reset Switch Assembly shall be Pneumercator **Model RS-2**.

**4B.** An electronic tank display shall provide independent, remote access to all real-time tank data and alarms from a distance up to 4000 feet from the main console. Communications shall be over an RS-485 multi-drop topology supporting the connection of up to 16 remote displays to one tank management system. The remote display shall be housed in a NEMA 4X enclosure for harsh industrial/outdoor environments. The display shall be sunlight-readable LED technology for maximum reliability in extreme temperatures. Pushbutton controls shall be one inch on centers for easy operation with gloved hands.

External Remote Electronic Tank Display shall be Pneumercator **Model ETD1000**

**4C.** An electronic remote console display replicator shall be available for applications where it is desired to have remote access to all main console display functions, including real-time tank data and alarms, leak sensor statuses, logs and configuration programming. The remote display replicator or tandem display shall operate with a cable length up to 500 feet and shall be housed in a locking NEMA 12 enclosure with NEMA 4 and NEMA 4X options.

External Remote Tandem Display shall be Pneumercator **Model TD1000K1-1 (NEMA 12)**

External Remote Tandem Display shall be Pneumercator **Model TD1000K1-2 (NEMA 4)**

External Remote Tandem Display shall be Pneumercator **Model TD1000K1-3 (NEMA 4X)**

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## V. Acceptable Products:

1. Control Console shall be Pneumercator Co. Model **TMS2000**.
2. Probe shall be Pneumercator **Model MP450S** for rigid lengths from 24 to 216 inches.  
Probe shall be Pneumercator **Model MP451S** for rigid lengths from 217 to 288 inches.  
Probe shall be Pneumercator **Model MP452S** for oil/water separator tanks.  
Probe shall be Pneumercator **Model MP461S** for flexible lengths from 12 to 216 inches.  
Probe shall be Pneumercator **Model MP462S** for flexible lengths from 217 to 288 inches.  
Probe shall be Pneumercator **Model MP463S** for flexible lengths from 289 to 600 inches.
- 3a. Petroleum sump, dispenser pan and steel tank double-wall leak sensor shall be Pneumercator **Model LS600-LD-BN-[F]**.
- 3b. Solvent sump, dispenser pan and steel tank double-wall leak sensor shall be Pneumercator **Model LS600-LD-SS-[F]**.
4. Dispenser pan or fiberglass tank annular leak sensor shall be Pneumercator **Model LS610-[F]**.
- 5a. 3-wire wet annular reservoir leak sensor shall be Pneumercator **Model RSU800-2**.
- 5b. 2-wire wet annular reservoir leak sensor shall be Pneumercator **Model RSU801-[F]**.
- 6a. Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100F**. (Standard)
- 6b. Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100XF**. (Extended Temperature)
- 6c. Electro-optical sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-100CF**. (Chemical/Solvent Resistant)
- 7a. Discriminating sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-200F**. (Standard)
- 7b. Discriminating sump, dispenser pan and dry annular leak sensor shall be Pneumercator **Model ES 825-200XF**. (Extended Temperature)
- 8a. Wet well leak sensor shall be Pneumercator **Model HS100**. (Standard)
- 8b. Wet well leak sensor shall be Pneumercator **Model HS100D** (Separate hydrocarbon and dry well alarms)
- 9a. External Remote Annunciator shall be Pneumercator **Model RA200**.
- 9b. Optional External Remote Test/Reset Switch Assembly shall be Pneumercator **Model RS-2**.
10. External Remote Electronic Tank Display shall be Pneumercator **Model ETD1000**
- 11a. External Remote Tandem Display shall be Pneumercator **Model TD1000K1-1 (NEMA 12)**
- 11b. External Remote Tandem Display shall be Pneumercator **Model TD1000K1-2 (NEMA 4)**
- 11c. External Remote Tandem Display shall be Pneumercator **Model TD1000K1-3 (NEMA 4X)**