1.01 GENERAL REQUIREMENTS

1. System Description

a) Furnish and install a complete Wireless Temperature Monitoring System (WTMS) as described in this specification. The system is defined to include, but not be limited to, remote devices for temperature monitoring, RF signal transmission and receiving, external inter-communication wiring, and software.

b) The manufacturer shall demonstrate the system is not a prototype and that similar systems have been field installed and successfully operated for at least five years. The WTMS vender shall have full responsibility for insuring the system performs as specified.

c) In the stand-alone version of the system, WTMS shall provide temperature monitoring data with information saved in a database and presented visually by request in tabular or graphic form. The system shall provide alarming at predetermined values of temperatures.

d) In the WTMS-PowerLogic® combined version of the system, temperature monitoring shall be provided in combination with power monitoring and the information shall be saved in SMS databases presented in accordance with Specification 16290-3, Power Monitoring and Control System.

e) The WTMS shall utilize Ethernet if a high speed network at the customer's facility supports direct connection of an unlimited number of personal computer workstations anywhere on the network.

f) Each Personal Computer Workstation (PCW) supplied by a customer, connected to the network, shall have equal access to information provided by the power monitoring devices for centralizing data display and alarming. Each PCW shall be independent from the other PCW's with it's own software to allow the user to retrieve and configure the information based on the users needs.

g) The high-speed network shall allow direct access to data provided by the temperature monitoring devices for implementing required maintenance measures.

h) Application software for PCW's shall be provided as described in Section 3.03 of this specification.

i) The WTMS components and software shall be "FreshLoc" as manufactured by Square D Company, or an approved equal.

j) All products shall not violate any United States patents.

2. References

a) All temperature monitoring Sensors and Receivers shall be comply with UL 508 requirements and are UL and IEC Approved.

b) Transmission units shall comply with FCC Emission Standards specified in Part 15.
3. Submittals
   a) Indicate electrical characteristics and connection requirements. Prior to WTMS component installation by Square D Company, the Customer shall clearly identify the components and locations where wireless sensors shall be installed, the external connections, and the PCW locations.
   b) Provide technical data sheets to indicate physical data, performance, and connection requirements.

4. Quality
   a) The WTMS vendor shall be ISO 9000 registered to demonstrate quality compliance.
   b) WTMS components included within the power equipment lineups shall be factory installed and tested prior to shipment to the job site.

2.01 PRODUCT REQUIREMENTS
1. Wireless Temperature Sensors (Transmitters)
   a) The Sensor shall be approved according to IEC Standard 60068-2-6(SEP1001 - Vibration Test) and IEC 68-2-32 (SEP1002 - Drop Test).
   b) The Sensor shall be calibrated as a system and be accurate to +/- 1 Degree C in the range from 0 - 150 Degree C. No annual re-calibration by the User shall be required to maintain this accuracy.
   c) The Sensor shall be rated for an operating temperature range of 0 Degree C to 150 Degree C.
   d) The Sensor shall consist of a single container with a removable lid without any extruding wires with the temperature metering, converting and transmitting electronics, and power supply (battery) embedded inside the container.
   e) The Sensor shall be attached directly to the surface of the component inside the electrical installation.
   f) The Sensor shall not interfere with the electrical performance of the component and the installation.
   g) The Sensor enclosure shall be made from UL Approved dielectric material.
   h) The Sensor enclosure shall be airtight for corrosion protection.
   i) The Sensor transmittance intervals shall change based on the rate of change of the temperature. The signal shall be sent once every minute for temperatures rising 3 Degrees C or more per minute and shall be sent once every three minutes at a stable temperature (battery life saving mode).
   j) The Sensors are powered with a 3V Li coin battery installed inside the enclosure. The battery life is expected to be for 7 to 10 years.
   k) The information and capabilities provided by the basic Sensor model shall include the following:
      1. Temperature
      2. Time of measurement
      3. Location and Unique RF Identification of each wireless sensor in the system.

2. Radio Frequency Readers (Receivers)
   a) Each Reader shall be installed in a close vicinity from the unit where wireless Sensors are installed to properly receive the signal from all required Sensors in the system.
b) The Reader shall be installed as part of a Temperature Monitoring system as indicated. The link with PCW shall be provided with CAT5 RJ-45 communication cable providing a communication link up to 100 Feet in distance.

c) The Reader may be connected in series, commonly referred to as a daisy chain, if more than 100 sensors are installed in the system.

d) The Readers may be connected in series if the location of the units are located at distances more than 100 feet from each other.

e) The number of Readers connected in series is not limited. The connection from one Reader to the next Reader shall be connected with a CAT5 RJ45 cable by using one of the available ports on each reader. Signals shall be passed to the computer from all readers connected along the chain. In series, the Readers will need to be approximately 100 to 200 feet apart.

f) The Reader shall communicate using the proprietary protocol and connect to any PCW with a 9-pin port.

g) The Reader shall provide logging and alarming information when connected via the network to a Temperature Monitoring computer.

h) The Reader is powered with 12V DC using the power transformer integral to the RS-485 Bus using the B&B RS485 to RS-232 converter.

i) The Reader is a wireless receiver (antenna) and shall support wireless input of multiple RF signals from up to 100 sensors simultaneously.

j) The Reader determines if the signal it receives from the Sensor is valid or if it is noise to be filtered out. The Reader shall mark the transmissions with the proper packet and send it via RS485 to a local computer.

k) The Reader output shall have two CAT5 RJ45 ports available for series connection between the Readers and the connection to the PCW.

l) The last Reader connected in series shall have a CAT5 terminator installed in the free port to diminish possible RF noise in the system.

3. WTMS Software for Standalone System

a) In general, the WTMS shall be supplied with a user friendly proprietary software suitable for operation on computer workstations which serve as central control stations by monitoring the Sensors in the system, recording temperatures, indicating alarm conditions, logging, and displaying system reports.

   1. The software shall be developed by the manufacturer of the monitoring devices and shall be designed specifically for temperature monitoring.

   2. The software shall be configured and not programmed. All software shall be configured by the vendor and delivered ready to use. This configuration shall include preparation of all graphics and displays required as a part of this project.

   3. Configuration shall be such that when additional monitoring devices are added to the system, the user is only required to input to the software the identification and location information of the new Sensor. The software shall then be able to display all data from that Sensor in an identical format as the other temperature sensors.

   4. The manufacturer shall support the software by regular maintenance upgrades, as required.

   5. The manufacturer shall provide regularly scheduled classes to provide instruction to the user on the operation of the software. Training will include, but not be limited to, the addition of future devices to the system, proper use and setup of reports and alarming, and other operations associated with the WTMS.
6. The software vendor shall offer a Technical Support program to offer technical assistance on using the software to manage the WTMS. The vendor shall have the ability to connect remotely to the WTMS to troubleshoot and diagnose any software problems.

b) The WTMS software for a standalone system shall provide data logging into the PCW. The system shall be able to log temperature data, location, and identification for all Sensors and Readers in the system. Logged information to be stored in the software log file include the following:

1. Each log entry shall be date and time stamped to the millisecond.
2. Each log entry shall hold RF Identification of each Sensor.
3. Each log entry shall hold the location of each Sensor.
4. Each log entry shall hold the temperature in a pre-selected temperature scale.
5. Each log entry shall hold the RF Identification of each Reader.
6. Each log entry shall hold the location of each Reader.

c) The alarm events shall be defined by the user and shall consist of, but not be limited to, the following:

1. High temperature limit
2. Low temperature limit
3. For each high or low temperature alarm value, the user shall be able to view the time stamp of the latest alarm.
4. The user shall be able to compare the highest temperature value recorded since the system is running against the current temperature value, until it is replaced with a new highest temperature value.
5. The user shall be able to determine if the highest temperature value recorded since the system is running was higher than the preset high temperature alarm limit by indicating in the color red.
6. The user shall be able to compare the lowest temperature value recorded since the system is running against the current temperature value, until it is replaced with a new lowest temperature value.
7. The user shall be able to determine if the lowest temperature value recorded since the system is running was lower than the preset low temperature alarm limit by indicating in the color blue.
8. Indication of an alarm condition shall be seen on the PCW monitor in the "Strobes Display" window in the color red.

d) The user shall be able to view the following temperature data in tabular format in the Strobe Display window:

1. Current temperature in both Fahrenheit and Celsius scales.
2. Average temperature for the last 15 minutes in both Fahrenheit and Celsius scales.
3. Average temperature for the last 60 minutes in both Fahrenheit and Celsius scales.
4. Highest temperature recorded in both Fahrenheit and Celsius.
5. Lowest temperature recorded in both Fahrenheit and Celsius.
6. The date and time of the last current measurement.
7. The date and time of the last highest temperature.
8. The date and time of the last lowest temperature.
e) The user shall be able to view the following temperature data in graphic format:
   1. Graph of all temperature vs. time for a specific time range and for specific Sensor locations.
   2. Graph of the temperature vs. time for a specific time range and for specific Sensor locations, averaged for pre-selected time intervals.

f) The user shall be able to convert averaged tabular data in Excel format for further data analysis.

4. WTMS Software combined with PowerLogic® SMS System
   
a) The temperature monitoring data shall be incorporated into the PowerLogic® database using an SMS-WTMS software interface.

b) The SMS-WTMS Version 1.0 is designed for PowerLogic® SMS-3000 Version 3.3.2.2 or greater, which is currently installed and operational.

c) The installation is designed to support Microsoft Windows 2000 Server Service Pack 2 or Microsoft Windows XP Server Service Pack 1.

d) SMS-WTMS Interface shall provide a continuous loading of temperature data into the SMS PowerLogic® database in a compatible format.

e) The recognition of wireless temperature sensors shall be as any other monitoring device supported by PowerLogic® software.

f) SMS-WTMS Interface shall provide all PowerLogic® SMS options available for data representation, such as live single and multiple device tabular and graphic reports, graphic and tabular historic reports, and alarming capabilities. For details on options available, refer to Specification 16290-3 Power Monitoring and Control System.

g) For details on Server/Client application software options, refer to Specification 16290-3 Power Monitoring and Control System.

h) For details on Interactive GFX-1000 Graphics options, refer to Specification 16290-3 Power Monitoring and Control System.

i) For details on Advanced Web-Enabled software options, which must be used in conjunction with PowerLogic® SMS-3000, refer to Specification 16290-3 Power Monitoring and Control System.

j) For details on Web-Enabled Interactive GFXWEB Graphics options, which must be used in conjunction with SMS-3000 and GFX-1000, refer to Specification 16290-3 Power Monitoring and Control System.

3.01 EXECUTION

1. Installation requirements shall be as follows:
   a) WTMS components, including temperature Sensors, Readers, and long-range connection kits, shall be factory tested prior to shipment to the jobsite.
   b) Temperature Sensors shall be installed within the equipment enclosure in pre-determined locations on de-energized equipment.
   c) Readers shall be installed outside the equipment enclosures at the optimal location for signal receiving and connected with CAT5 RJ45 communication cable to PCW using the long-range connection kit.

2. System start-up and training requirements shall be as follows:
   a) On site start-up and training of the WTMS shall be included in the project bid.
   b) Start-up shall include a complete working demonstration of the WTMS with simulation of possible operating conditions that may be encountered.
c) Training shall include any documentation and hands-on exercises necessary to enable electrical operations personnel to assume full operating responsibility for the WTMS after completion of the training period.

d) The project bid shall include [ ] days start-up assistance and [ ] days training to include [ ] site trips.

e) The temperature monitoring vendor shall offer regularly scheduled factory training for customers on all aspects of temperature monitoring, including:

1. Comprehensive software and hardware setup, configuration, and operation.
2. Temperature monitoring and data reporting for a standalone system.
3. Advanced simultaneous power and temperature monitoring, if applicable.

f) The temperature monitoring manufacturer shall provide a full-time telephone technical help center for customers.

3. Temperature monitoring management services shall include the following:

a) Manufacturing shall offer complete temperature monitoring and analytical services, including:

1. Data processing of monthly reporting on thermal status and confirmation of normal thermal status of the units.
2. Thermal status evaluation by correlating thermal behavior and load and thermal analysis of heat distribution.
3. Analytical services on thermal behavior evolution based on experience, equipment problems, and recommendations on thermal behavior improvement.

b) Engineers performing these studies shall be employees of manufacturer and have engineering degrees. They shall justify their proficiency by demonstrating past studies and projects similar to those to be undertaken.

c) The WTMS vendor shall make all designs and definitions for proper system component positions required to make the system fully functional at each location. These definitions may include:

1. Proper locations of the Sensors and Readers.
2. Proper means for attaching the Sensors.
3. Configuration of software, servers, and workstations.
4. Communicate interface installation and configuration.
5. Communication network design.

d) The temperature monitoring system vendor shall provide development, integration, and installation services required to complete and turn over a fully functional system. This shall include:

1. A project manager shall be assigned to each facility WTMS implementation. Typical responsibilities shall include coordination of personnel, information and on-site supervision for the various levels and functions of suppliers required for completion of the project. The project manager shall provide strategic direction for the entire team with responsibilities including daily operational and tactical implementation of projects, provide logistics, and ensure follow up and closure of site related issues.
2. All technical coordination, installation, integration, and testing of all components.