

# CSI Specification 27 53 13

## Wireless Clock System

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**This product specification is written according to the Construction Specifications Institute (CSI), *MasterFormat*<sup>™</sup>, *SectionFormat*, and *PageFormat*, contained in the *CSI Manual of Practice*. Reference 16735, Master Format 2004 section 27 53 13**

### **PART 1 – GENERAL**

#### **1.1 Section Includes**

- A. Transmission System
  - 1. System Controller with Receiver (GPS, CDMA, Ethernet)
  - 2. Primary Internal Transmitter
  - 3. Primary External Transmitter
  
- B. Wireless Synchronized Devices
  - 1. Analog Clock
  - 2. Digital Clock
  - 3. Elapsed Time Indicator
  - 4. Master Clock Synchronizer
  - 5. Other

#### **1.2 Related Divisions and Sections**

- A. Division 26 00 00 - Electrical 120V for 60Hz grounded outlet required for System Master.
- B. Division 26 00 00 - Electrical 120V for 60Hz grounded outlet required for external transmitter
- C. Division 26 00 00 - Electrical 120V for 60Hz grounded outlet for each AC powered clock, Computer Time Synchronizer and Master Clock Synchronizer and other components

#### **1.3 References**

- A. National Fire Protection Agency (NFPA) – 70, National Electric Code 2005

#### **1.4 Definitions**

- A. (GPS): Global Positioning System A worldwide system that employs 24 orbiting satellites in an integrated network to determine geographic location anywhere in the world, and which employs and transmits atomic time.
  
- B. (CDMA): Code Division Multiple Access A time synchronization used in the mobile telephone industry.
  
- C. Ethernet: Provides time synchronization via SNTP (Simple Network Time Protocol) or Daytime Protocol from time server.

## **1.5 Submittals**

- A. Product Data: Submit complete catalog data for each component, describing physical characteristics and method of installation. Submit brochure showing available colors and finishes of clocks.
- B. Operating License (if required): Submit evidence of application for operating license prior to installing equipment. Furnish the license, or if the license has not been received, a copy of the application for the license, to the Owner prior to operating the equipment. When license is received, deliver original license to Owner.
- C. Samples: Submit one clock for approval. Approved sample shall be tagged and shall be installed in the work at location directed.
- D. Manufacturer's Instructions: Submit complete installation, set-up and maintenance instructions.

## **1.6 Quality Assurance**

- A. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing commercial timekeeping systems with a minimum of 10 continuous years of documented experience.
  - 2. Installer: Company with documented experience in the installation of commercial timekeeping systems.

## **1.7 Regulatory Requirements**

- A. Equipment and components furnished shall be of manufacturer's latest model.
- B. System Controller, Transmitter and receiver shall comply with Part 90 of FCC rules, as follows:
  - 1. This device may not cause harmful interference.
  - 2. Transmitter frequency shall be governed by FCC Part 90.35.
  - 3. Transmitter output power shall be governed by FCC Parts 90 and 74.
- C. System shall be installed in compliance with local and state authorities having jurisdiction.
- D. Permits: Obtain operating license for the transmitter from the FCC. (FCC licensing can be coordinated by system manufacturer)

## **1.8 Delivery, Storage and Handling**

- A. Deliver all components to the site in the manufacturer's original packaging. Packaging shall contain manufacturer's name and address, product identification number, and other related information.
- B. Store equipment in finished building, unopened containers until ready for installation.

## **1.9 Field Conditions**

- A. Clocks shall not be installed until painting and other finish work in each room is complete.
- B. Coordinate installation of GPS receiver and external antenna for access to the roof or exterior side-wall so that the bracket and related fasteners are watertight.

# **PART 2 - PRODUCTS**

## **2.1 Systems Description**

- A. A basic wireless timekeeping system, consisting of a system controller, a built-in or external transmitter, transmitter antenna, a means of receiving time synchronization (GPS, CDMA, Ethernet), analog or digital clocks, and accessory or optional components for expanding the system and its operations, that is capable of synchronizing clocks and computers throughout the facility on a daily basis.
- B. System shall synchronize all clocks to each other. System shall utilize GPS, CDMA, or Ethernet technology to provide atomic time to components. System shall not require hard wiring for its components except for AC power. Analog clocks may be battery operated for full portability if required. Clocks shall automatically adjust for Daylight Saving Time per the Daylight Saving time settings in the system controller.
- C. Analog Clocks shall synchronize to +/- 1 second of the master clock displayed time.
- D. The system shall include an internal real time clock reference so that failure of the GPS signal shall not cause the clocks to fail in indicating the correct time.
- E. The system shall incorporate a "fail-proof" design so that a temporary power interruption shall not cause failure of the system. Upon restoration of power, the system shall resume normal operation.
- F. The system shall include a optional notification pager or communication method to notify a local supervisor or maintenance personnel when the pager is active and the master is transmitting to verify signal reception.
- G. Analog clocks shall be battery operated for complete portability and relocation freedom, or AC powered for many years of maintenance-free operation.
- H. System instruction manual and equipment shall be available for building site transmitter signal reception diagnosis.

## 2.2 Manufacturer

- A. Wireless timekeeping system and its components shall be manufactured by one of the following acceptable manufacturers:
  - 1 American Time & Signal Company
  - 2
  - 3
  - 4
  - 5

## 2.3 Equipment

- A. Wireless system controller: The system controller encoder shall incorporate a display and a keypad to provide the following features:
  1. Time zone selection via the keypad and display for all USA time zones as well as others requiring programming by American Time and Signal. Includes all US time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii.
  2. Automatic Daylight Saving Time Adjustment can be enabled or disabled from keypad.
  3. GPS interface and real time GPS status display mode.
  4. Password protected Administrator Menu to set the date, local time zone, clock addresses, and other system parameters as needed.
  5. Database programming and administration using its keypad and LCD display

6. The system controller shall contain an internal clock such that failure of reception from the GPS will not disable the operation of the clocks.
- B. GPS Receiver:** GPS roof receiver with 10' cable attached (optional length extension cable available: 50', and 100' or specified). The GPS Receiver shall be a complete GPS receiver with a built-in antenna, designed for roof or outdoor mounting. Provide mounting bracket for attachment to roof structure, CDMA antenna or connector for Ethernet synchronization.
- C. Transmitter:** Wireless transmitters may be internal or external, up to 350 Watts. The transmitter parameters shall be:
1. Frequency Range: multiple frequencies acceptable but are specific to manufacturer
  2. Transmitter output power: Internal 1 - 5 Watt or External 10-350 Watt in external case
  3. Transmission Range: Up to 50 miles radius (transmitter dependent)
  4. Radio technology: Narrowband FM, 12.5 KHz bandwidth
  5. Transmission format: POCSAG, digital one-way communication
  6. Digital Data rate: 512 - 2400BPS
  7. Operating range: 0 degrees C. to 70 degrees
- D. Antenna:** shall be for indoor or outdoor applications. Antenna polarization shall be dependent on manufacturer's recommendation.
- E. Power supply:** (included with master),
1. Input: 120-volt AC 50/60 Hz
  2. Output: 12-volt DC, 3 Amps
  3. Other
- F. Recommended (but optional) Surge Protector/Battery Backup:**
1. Input: 120-volt AC 60 Hz +/- 1 Hz.
  2. Output: 120-volt AC, 550VA, 300 watts
  3. Surge Energy Rating: 700 joules with 10x1000uS pulse
- G. Analog Clocks:** Analog clocks, estimated 10", 12" 15" and other diameter sizes. Additional colors and finishes are available from manufacturer. Analog clocks shall be wall mounted. Clocks shall have polystyrene frame and polycarbonate lens (other options available). Face shall be white. Hour and minute hands shall be black, second hand is red. Other clock features shall be:
1. Analog clocks with no user mechanical adjustments. Run time of a half hour after power loss without losing time for AC versions.
  2. Time shall be automatically updated from the transmitter with a minimum of 1 time per day.
  3. Use manufacturers recommended batteries or AC power adapter without battery.
  4. The clock shall have an ultra sensitive UHF receiver (better than -110dBm) and integrated internal antenna or other

5. The clock will keep operating using its internal quartz clock in case of signal reception loss due to malfunction of the wireless system controller or transmitter.
  6. Analog clock faces shall bear Owner's logo as indicated or end user's specific logo, name or other.
  7. Wire guards: Provide one for each analog clock as follows:
    - a. 15 by 15 inch size, for nominal 12-inch diameter analog clocks.
    - b. 19 by 19-inch size, for nominal 15-inch diameter analog clocks.
    - c. Manufacturers guards sized to protect their products
- H. Wood Clocks:** Wood bezel analog clocks available with multiple finishes and sizes available per manufacturer. Analog clocks shall be wall mounted. Dial face shall be white. Hour and minute hands shall be black, second hand is red. Other clock features shall be:
1. Wood Analog clocks will have the same product characteristics and operating requirements as the standard analog clocks (reference analog clocks specifications above).
- I. Digital Clocks** (require line voltage to illuminate digits)
- J. Steel/Aluminum Clocks** approximately 17" outside diameter (other sizes available per manufacturer)
- K. Elapsed Time Indicators**
- L. Security Brackets**
- M. Wall Shelf**

## **2.4 Substitution Limitations**

- A. Proposed substitutions, to be considered, shall be manufactured of equivalent materials that meet or exceed specified requirements of this Section.
- B. Other systems requiring wiring and/or conduit between system controller and clocks will not be acceptable.

## **2.5 System Operation and Startup Sequence**

- A. System shall receive Atomic Time information from GPS, CDMA or Ethernet that is connected to the system controller The system controller is a powerful multi-tasking device that is capable of sending accurate time information to synchronize all the system wireless clocks and accessories. The system can be monitored and programmed from the system controller keypad and LCD.
- B. Wireless System Controller Operation
  1. When power is first applied to the system controller, it checks for and displays the software version and looks for the GPS time signal. Once the system controller has received the GPS time, it sets its internal clock to that time. The system controller then starts to transmit its internal time according to the specified time synchronization mode. The system controller updates its internal clock every time it receives valid time data from the GPS receiver.

### C. Analog Clock Operation

1. For battery clocks, follow manufactures start up procedure to power up the clock. For AC powered analog clocks, apply AC power and follow manufacturers start up procedure. There is no need for any additional adjustment (the clock movement adjustment is fully automatic).
2. After a few seconds of initial setup, the clock receiver will look for valid time transmission. The monitoring LED (if equipped) at the back of the clock will flash during that period of time. After a valid time data is received the monitoring LED will stop flashing, and the clock will adjust to the right time. The clock will look for valid time signals multiple times (minimum of once) each day, and will synchronize to the correct time if needed.

### D. Digital Clock Operation

1. Connect the DC adapter (supplied with each digital clock) to the appropriate power source. Select the display mode (12 or 24 hours) and the brightness level using the switches in the back of the clock. There is no need for any additional adjustment.
2. After several seconds of initial setup, the clock receiver will look for a valid time transmission and synchronize to the system controller.

## **PART 3 - EXECUTION**

### **3.1 Examination**

- A. Verify that construction is complete in spaces to receive equipment and that rooms are clean and dry.
- B. Verify that 120-volt electrical outlet is located within 6 feet of location of transmitter and the outlet is operational and properly grounded.
- C. Verify that all 120-volt electrical outlets for the AC powered clocks are located at the exact installation point and the outlet is operational and properly grounded

### **3.2 Field Inspection**

- A. Prior to final acceptance, inspect each system component to function properly and replace parts that are found defective.

### **3.3 Manufacturer Services**

- A. If needed, provide technical assistance as demonstrated in the manufacturer's system user guide, on product start up and system setup, to owners or installers representatives via phone, fax, or e-mail.

### **3.4 System Installation**

- A. Install in accordance with manufacturer's installation manual furnished with the system, for proper installation of each system component.

### **3.5 Cleaning**

- A. Prior to final acceptance, clean exposed surfaces of all system components, using cleaning methods recommended by the manufacturer.

END OF SECTION