

2008/08/25

**SECTION 13502**  
**COMPUTER NETWORK AND HUMAN MACHINE INTERFACE (HMI) HARDWARE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Computer network and HMI hardware requirements which includes but is not necessarily limited to:
  - a. LCD flat panel type monitors.
  - b. Personal computers - HMI applications.
  - c. Network servers.
  - d. Data storage.
  - e. Field mounted flat face panels.
  - f. Ethernet switches.
  - g. Printers.
  - h. Software.
  - i. Accessories and maintenance materials.

**1.2 QUALITY ASSURANCE**

**A. Referenced Standards:**

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - a. 802.3, Information Technology - Local and Metropolitan Area Networks - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.
    - 1) 802.3u: IEEE Standards for Local and Metropolitan Area Networks: Supplement to Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Media Access Control (MAC) Parameters, Physical Layer, Medium Attachment Units, and Repeater for 100 Mb/s Operation, Type 100BASE-T.
    - 2) 802.3x: IEEE Standards for Local and Metropolitan Area Networks: Specification for 802.3 Full Duplex Operation.

**1.3 DEFINITIONS**

- A. HMI: Human Machine Interface.
- B. LCD: Liquid Crystal Display.
- C. OPC: "OLE for Process Control", a software standard utilizing a client/server model that makes interoperability possible between automation/control applications and field systems/devices.
- D. PC: Personal Computer.
- E. RAID: Redundant Array of Independent Disks, a method of storing the same data in different places on multiple hard disks.
- F. RAM: Random Access Memory.
- G. SCSI: Short for Small Computer System Interface, a parallel interface standard used for attaching peripheral devices to computers.
- H. SDRAM: Synchronous Dynamic RAM.
- I. SNMP: Simple Network Management Protocol, a set of protocols for managing complex networks.

J. TFT: Thin-Film Transistor, a technology for building LCD screens.

#### 1.4 SUBMITTALS

##### A. Shop Drawings:

1. See Specification Section 13440.
2. Product technical data including:
  - a. Acknowledgement that products submitted meet requirements of standards referenced.

##### B. Operation and Maintenance Manuals:

1. Provide complete manuals on all equipment.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed within the following Articles are acceptable.

#### 2.2 LCD FLAT PANEL TYPE MONITORS

##### A. Acceptable Manufacturers:

1. Dell.
2. NEC.
3. Samsung.
4. Hewlett-Packard.
5. Or approved equal.

##### B. Design Requirements:

1. Type of display: Color TFT active matrix LCD, 20 IN minimum.
2. Native Resolution:
  - a. 1600 x 1200.
3. Image brightness: Minimum 250 cd/m<sup>2</sup>.
4. Display image contrast ratio: 500:1 or higher.
5. Maximum sync rate (vertical scan rate x horizontal scan rate): At least 75 Hz x 80 KHz.
6. Viewing angle: 170 degrees both vertical and horizontal.
7. Adjustable tilt and swivel.
8. Anti-glare flat screen.
9. Power input: 120 Vac.

#### 2.3 PERSONAL COMPUTERS - HMI APPLICATIONS

##### A. Acceptable Manufacturers:

1. Dell.
2. HP/Compaq.
3. Or approved equal.

##### B. PCs shall be in accordance with the following minimum requirements:

1. Minimum 3 GHz processing speed and 1 MB cache.
2. Minimum 1 GB RAM, expandable up to 2 GB.
3. Minimum 80 GB hard drive.
4. DVD-RW drive.
  - a. Read speed:
    - 1) 40x CD.
    - 2) 16x DVD.
5. Accelerated graphics port video card with minimum 4 MB.
6. Communication ports as listed below:
  - a. All communication ports as required by functional requirements of Contract Documents.
  - b. USB 2.0.

7. Ethernet networking cards for LAN communication.
8. 32-bit sound card with built-in speakers.
9. Case style: Tower.

**C. Keyboards:**

1. Utilized for PLC configuration and plant operation.
2. Incorporate Standard IBM-QWERTY design with numeric keypad and assigned function keys.
3. Sculptured keys.
4. Tactile feedback.

**D. Mouse for cursor movement.**

**2.4 FIELD MOUNTED FLAT FACE PANELS**

**A. Acceptable Manufacturers:**

1. Allen-Bradley Panel View Plus 1000.
2. GE QuickPanel Ethernet.
3. Siemens SIMATIC MP 270.
4. Or approved equal.

**B. Design and Fabrication:**

1. Display:
  - a. Minimum 10 IN display.
  - b. 640 x 480 pixels.
  - c. Color graphics.
2. Touch screen.
3. 24 Vdc power supply.
4. Real time battery-backed clock, time stamp data.
5. Communicate via Ethernet to Plant's HMI Network.
6. Provide password protection to prevent unauthorized entries for a minimum of two (2) levels:
  - a. Authorization to operate.
  - b. Authorization to adjust setpoints.
7. Operating temperature: 32 DegF to 131 DegF.
8. Humidity: 10 to 90 percent RH non-condensing.

**2.5 ETHERNET SWITCHES**

**A. Acceptable Manufacturers:**

1. Hirschmann.
2. Siemens.
3. Sixnet.
4. TC Communications.
5. N-TRON.
6. Or approved equal.

**B. Design and Fabrication:**

1. Support Ethernet 100 MBit/s.
2. Manageable:
  - a. Support SNMP and Web based management.
3. Rapid Spanning Tree Protocol.
4. IGMP (Internet Group Management Protocol) support for IP multicast filtering to enable switches to automatically route messages only to appropriate ports.
5. Backbone ports for connection to multimode fiber via type SC connectors.
  - a. Quantity as required for communication with devices as depicted in the Contract Documents.
6. 10/100 MBit/s twisted pair ports as required for communication with devices as depicted in the Contract Documents.

- a. Unless otherwise noted, provide at least one (1) spare 10/100 MBit/s port (twisted pair) at each Ethernet switch.
- 7. Function in self-healing ring structure.
  - a. If one section in the ring fails, the ring structure changes to a line structure within 0.5 seconds.
- 8. Check all received data for validity.
  - a. Discard invalid and defective frames or fragments.
- 9. Monitor connected TP/TX line segments for short-circuit or interrupt using regular link test pulses in accordance with IEEE 802.3.
- 10. Monitor attached fiber optic lines for open circuit conditions in accordance with IEEE 802.3.
- 11. As applicable, meet requirements of:
  - a. IEEE 802.3u (100 Mbps applications).
  - b. IEEE 802.3x (full duplex operation).
- 12. Provide LED status lights to indicate:
  - a. Power: Supply voltage present.
  - b. Fault.
  - c. Port status.
- 13. Environmental rating:
  - a. Operating temperature: 32 Deg F to 122 Deg F.
  - b. Humidity: 95 percent relative humidity, non-condensing.

## 2.6 PRINTERS

- A. Color Printers:
  - 1. Acceptable manufacturers:
    - a. Dell photo all in one 968.
    - b. Hewlett Packard.
    - c. Or approved equal.

## 2.7 VIRTUAL PRIVATE NETWORK (VPN)

- A. Appliances for connection to DSL service.

## 2.8 SOFTWARE

- A. Provide all software and associated programming/configuration required to meet performance requirements of the Contract Documents.
  - 1. At substantial completion of the Project:
    - a. Turn current licenses for all software over to the Owner in the Owner's name and install the latest version, upgrade or service pack for all software.
    - b. Provide the respective software supplier's Comprehensive Support Contract for all software covering a full one (1) year warranty period which shall provide no cost software upgrades, service packs and tech support from the software supplier.
- B. HMI Software:
  - 1. Subject to compliance with the Contract Documents, the following HMI software packages are acceptable:
    - a. Rockwell RS View Studio.
    - b. Or approved equal.
- C. Ethernet Network Management Software:
  - 1. Software to include an OPC Server, capable of integrating real-time SNMP tag data into OPC client enabled HMI software databases.
  - 2. Software shall allow control of polling rate for SNMP requests, as well as limit access to write SNMP data on each SNMP tag.
  - 3. Software shall have pre-developed tag databases for several manufacturer's Ethernet network devices, as well as generic MIB (Management Information Base) tag databases.
  - 4. Software shall have integrated OPC client data viewer software, so that SNMP data may be viewed without having to create HMI tags.

- D. Provide PC with the latest edition of the following software:
  - 1. Operating system: Microsoft Windows XP including remote desktop connection.
  - 2. AntiVirus software: Norton or McAfee AntiVirus Software.
  - 3. Microsoft Office Small Business Edition.
  - 4. SCADAalarm, Win 911/Lite or Rockwell RS View Messenger.
  - 5. PC Anywhere.
  - 6. RSVIEW 32, 32K tags Works, Run Time License.
  - 7. Rockwell RS Linx Professional.
- E. All software must be latest edition and licensed to the Owner.
- F. Provide one (1) year free upgrade for all software.

## **2.9 ACCESSORIES AND MAINTENANCE MATERIALS**

- A. Provide all accessories required to furnish a complete computer-based network for the control system to accomplish the requirements of the Drawings and Specifications.
- B. Furnish Owner with the following extra materials:
  - 1. One (1) spare Ethernet switch of each type utilized.
  - 2. One (1) spare toner cartridge per laser printer provided.

## **PART 3 - EXECUTION**

### **3.1 DEMONSTRATION**

- A. Demonstrate system operation in accordance with these contract documents.
- B. On-Site Training:
  - 1. Provide employee of the manufacturer or certified representative to provide 1 week of operating and maintenance training at the Project site after the system has successfully undergone all field testing and acceptance procedures. Can be concurrent with Section 13500 training.
    - a. As a minimum, training shall cover:
      - 1) Hardware overview.
      - 2) Software overview.
      - 3) Maintenance.
      - 4) Trouble shooting.
      - 5) Operation, e.g., changing set points, passwords, etc.
- C. Follow up visits. Provide 1 day on site follow up visits as follows:
  - 1. 1-2 months after acceptance.
  - 2. 6 months after acceptance.

### **3.2 INSTALLATION AND CHECKOUT**

- A. Provide installation and checkout in accordance with Specification Section 13440.
- B. Configure VPN Appliances and MS Remote Desktop Connection for access to Wonderware from remote PC using DSL.

**END OF SECTION**